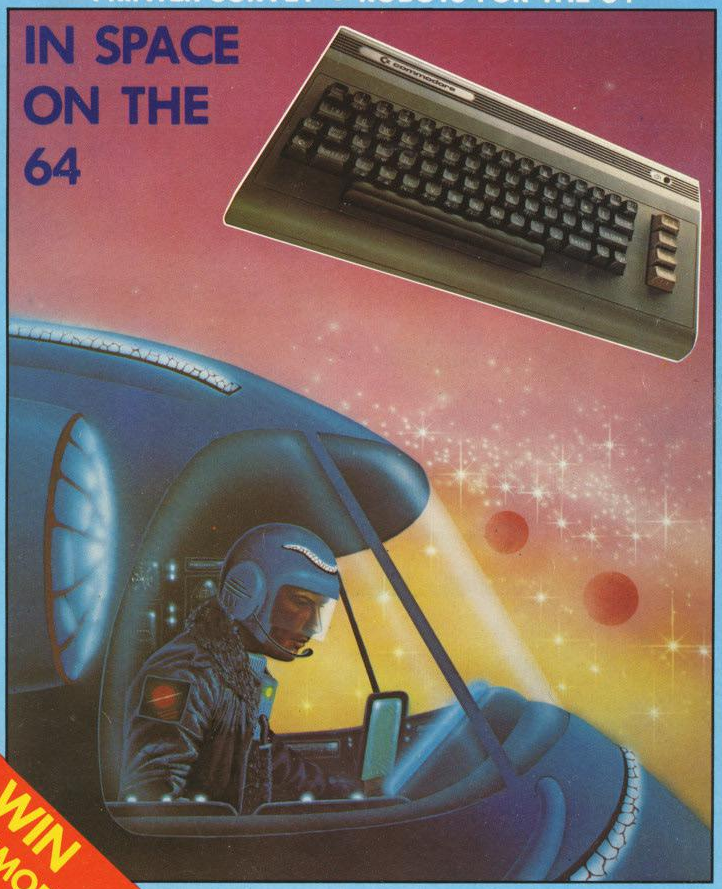
Commodore HORIZONS

The independent Commodore magazine

75p December 1983/January 1984

WRITING SOFTWARE • NEW CARTRIDGES
PRINTER SURVEY • ROBOTS FOR THE 64

IN SPACE ON THE 64



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The independent Commodore magazine

Editor
Graham Cunningham

News Editor
David Kelly

Software Editor
Graham Taylor

Editorial Secretary
Cleo Cherry

Advertisement Manager
David Lake

Advertisement Executive
Jeremy Kite

Administration
Theresa Lacy

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Telephone Number
(all departments)
01-437 4343

Address
Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD.

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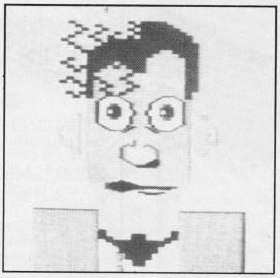

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EDITORIAL

WELCOME TO THE FIRST issue of this new magazine for all users of Commodore's micros — whatever your machine, and whether you're a games addict or a serious user, you'll find something of interest inside. We'll be back on the 12th of January with a February issue — by which time you'll have had a chance to let us know what you think of the magazine. From then on *Commodore Horizons* will be published on the second Thursday of each month, so keep in touch. And we've got one particular topic in mind — read on . . .

Commodore is a survivor. As a computer company it is one of the few which has withstood the chill winds of the price cutting war sweeping out the deadwood from the American computer industry. Commodore is sometimes blamed for the price cutting war. The company's policy is to cut its computer prices automatically in line with falling manufacturing costs — the greater the volume the cheaper the computer becomes, especially as a Commodore subsidiary, MOS Technology, makes many of the chips Commodore uses. It is good news for all of us that Commodore has now started to adapt its price cutting policy on computers to its software — much of the Commodore add-on equipment has been grossly overpriced for the past few years.

Despite the size of the Commodore market worldwide, however, there are a very few firms producing Commodore software. This is most noticeable when compared to the hundreds of small, innovative software companies producing original material for the Sinclair Spectrum computers. We think it is time that those software companies started producing software for the Commodore range of machines. Why not join us in a campaign to pursuade some of the Spectrum software houses to start writing software for the Commodore Vic 20 and 64?

We will need to pursuade them that a market exists for their wares, which means that they have to hear from you. Write to the *Commodore Horizons* Software Campaign with your pleas and once a month we will mail the full list of names and addresses to over 100 software companies which, as far as we know, do not produce software for Commodore computers. Let's see those letters rolling in. And tell us what sort of software you would like to see.

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CHALLENGE

Are you game enough to play?

Interesting Games For Interesting People From Anik

LETTERS PAGE

Calling all pool players

I WOULD like some Vic 20 adventure games published because not many magazines have adventure games in them. Would it also be possible for someone to send in a snooker or pool program for the Vic?
Michael Cahill
Hoddesdon
Herts.

WELL, WOULD IT? Keep reading the magazine and you'll find out if anybody has obliged. As for adventures, we'll definitely be doing some reviews and programming articles soon.

Unusual Vic features

SO MUCH attention has been placed elsewhere on the faults of the Spectrum that some very unusual features of the Vic have been neglected.

Plug a Vic 20 onto a teletext television and run this line:
FOR I=0 TO 65536:PRINT CHR$(PEEK(I));:NEXT
While this is happening, select teletext page 100. Sometimes random green letters appear in the top right hand corner, where the time normally is.

Another point is that the documentation for the Superexpander cartridge is deficient. An extra command, Graphic 4, will give almost all the RAM to the user, but will crash the computer if graphic 1, 2 or 3 hasn't been previously selected.

Other things not mentioned are the fact that function keys can be programmed in a program, and that chords can be played in a PRINT statement.
Stephen Loughran
London NW6

Confusion reversed

I BELIEVE some users may be confused by the colour sign for control-3 (red). This is shown in *Personal Computing on the Vic 20* as the reversed oblique stroke (see page 153 — special symbols).

However, on our Vic 20 pressing control-3 prints up a reversed £ sign symbol. This caused a lot of confusion when we were first learning to use our Vic as some programs use one symbol and some the other.

I hope this will be of some help to other first-time users.
Lynne Turner
London E16

Right royal request

I AM interested in submitting a utility program to your magazine to help users with their home accounting. It runs on a Vic 20 with +3K RAM.

Before submitting the program I wish to know how much you pay for programs and if you pay an outright price or a form of royalties on the amount of magazines sold.
R G Varns
Crayford
Kent

I'M AFRAID you're not going to get rich by contributing programs to *Commodore Horizons* (think instead of the pleasure and privilege of appearing in print!). We pay £6.00 for listings published in Software File, and up to £30 for our Star Game (and no, don't start thinking about royalties — our office Sirius couldn't cope with the strain).

Simulation located

A RELIABLE version of simulated PRINT-AT uses the following Vic memory locations:
209-210:Pointer 10 screen line
211:Position of cursor on above line
214:Row where cursor lives
The above is an extract from the Vic 20 programmers' reference guide.

My routine is as follows:
A=7680+Y*22:B=INT (A/256):C=A—B*256
POKE 209,C:POKE 210, B:POKE 211,X:POKE 214,Y
J D Peel
Market Harborough
Leics

Cassette aggravation

MY VIC was purchased as a replacement for a ZX81. When I originally purchased the ZX81 I also bought a good quality cassette (computer compatible) to go with it, and that is the problem.

Recently I wrote to Commodore and duly received a letter informing me that if I took my cassette recorder to my local dealer I could have it modified. The manager of my local dealer informed me that it did not carry out this type of work and was only an agent.

They could forward my cassette recorder to Commodore but there would be a handling charge of about £10 plus the cost of the work to be carried out. At this point he did say that other customers of his had expressed similar complaints. All that was needed in most cases, he said, was a cable with the appropriate plugs and fittings to enable the cassette recorder to be used with the Vic 20.

Have other Commodore users overcome this problem? If so, could they supply information where the parts can be purchased and how the work is carried out.
Terence Webb
Redruth
Cornwall

Interpreting the words

I HAVE been interested in micro computers for well over a year now (even to the point of it becoming a mania sometimes) but to date have only "played" with those micros on demo in shops.

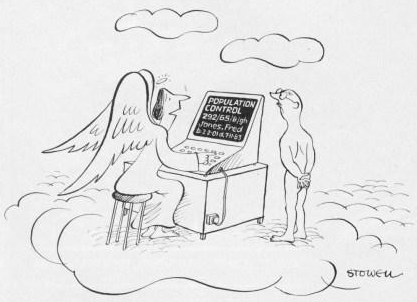
Now has come the time to buy one and after much deliberation I have decided on the Commodore 64, mainly for two reasons:

1. The built-in music synthesiser seems to be more advanced than in other micros of same price.

2. The 64K RAM (it would cost me more to upgrade a Vic 20 to the same capacity, and besides that I hate the 22×33 screen display).

But in the CBM 64 data sheet it states that "existing Vic and 40 column Pet Basic programs can be easily converted". I would like to know just what "easily" means. I rang Commodore re this and they said it's practically a complete re-write (this it not my idea of being easy).

One would think that Commodore would have designed a conversion cartridge to plug into the rear part of the 64 which would enable direct input of Vic software.
M R Hoe
Skegness
Lincs.



"I mean, you didn't really expect your name was written in a great big thumping real leather bound BOOK OF LIFE, did you?"

This is the chance to air your views — send your tips, complaints and compliments to Letters Page, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD

METAGALACTIC LLAMAS BATTLE AT THE EDGE OF TIME

A fast and original game for the unexpanded VIC. Challenging and colourful, with good sonics and a unique game action and design, this promises to be the most exciting new 3.5K VIC game since the introduction of GRIDRUNNER nearly a year ago. **£5.50**

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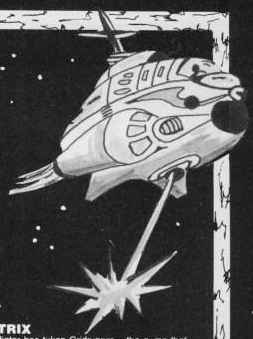
Experience Laser Zone – an utterly NEW totally ORIGINAL masterpiece of Video games design. Learn to control two spaceships at once. Feel the EXHILARATION as, after long hours of practice, you control the two ships so that they function as a smooth, co-operative team! Feel the raw POWER as you lunge for the electro button and BLAST your enemies into expanding clouds of SPACE JUNK! Feel the humiliation as a carelessly aimed BLAST slams into the side of your last remaining ship!! 8K expansion required.

Available for Commodore 64 **£7.50** and VIC-20 **£6.**



MATRIX

Jeff Minter has taken Gridrunner – the game that topped bestseller charts in USA and UK – and created an awesome sequel.

Graphically superb, it features multiple screens, new aliens and attack waves, mystery bonuses, renegade humanoids, deflexor fields, diagonal tracking, countdown/panic phase and much, much more...

Packed into 20 mind-zapping zones and accompanied by incredible sonics.

8K expansion required.

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ATTACK of the MUTANT CAMELS

Planet earth needs you! Hostile aliens have used genetic engineering to mutate camels from normally harmless beasts into 90 foot high, neutronium shielded, laser-spitting death camels!! Can you fly your tiny, manoeuvrable fighter over the mountainous landscape to weaken and destroy the camels before they invade the humans stronghold! You must withstand withering laser fire and alien UFOs. Game action stretches over 10 screen lengths and features superb scrolling, scanner 1/2 player actions and unbelievable animation! Play this game and you'll never be able to visit a zoo again without getting an itchy trigger finger! Awesome m/c action!

Available for Commodore 64 **£7.50.**

HOVER BOVVER

A totally original arcade game for C64 featuring outstanding graphics and a sound track created by a professional Piano Wizard. Gordon Bennet has borrowed his neighbour's Air-Mo lawnmower. Mow your way through as many of the 16 lawns as you can before the pursuing neighbour retrieves his mower. Set your dog onto the neighbour to help you out of tight spots and don't annoy the gardener. Try not to plough through the neat flower beds or overheat your mower!

£7.50

ABDUCTOR

A classic new space game! ZAP the swirling alien hordes before they ram you – and abduct your humanoids! Survive the assault for long enough and you'll get an extra stage on your spaceship with double firepower! Awesome unexpanded VIC Action. **£5.00**

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Finally true arcade quality on the unexpanded VIC! Shoot down the segmented DROIDS invading the grid. Beware of the pods and zappers! The awesome speed, sound, and graphics gives you the best blast available for unexpanded VIC.

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Commodore 64 **£5.00**
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NEWS DESK

Commodore gets that tip-top feeling

A Portable feast

THE CBM 64 portable computer will go on sale in Britain before Christmas, according to Commodore UK's marketing manager, John Baxter.

First shown at the Chicago CES show in June, the SX64's launch in the US is now "imminent".

The SX64 has 64K RAM and is based on the 6502-compatible 6510 chip. It has a built-in 6 inch colour monitor and single floppy-disk drive with 170K storage capacity. The detachable keyboard is of the full-size full-travel type.

The unit has cartridge, Centronics and monitor ports and is compatible with Commodore 64 software and peripherals, including the VicModem unit.

A Z80 cartridge/disk is planned for the SX-64 to make it CP/M compatible.

Languages planned include Pascal, Logo, Comal, Assembler and Pilot.

No UK price has yet been fixed but its US tag of $995 would suggest a price of around the £900 mark. A review of the machine is scheduled for our next issue.

COMMODORE now claims to be the top-selling UK home computer company.

A spokesman for Commodore said that reports from retailers indicate that "unit sales of the Commodore 64 and Vic 20 machines now exceed sales of the Sinclair ZX Spectrum and ZX81 models", Commodore's closest rivals.

"We have been British brand leader in sterling sales for some time, but now we are ahead in units, bringing us into line with the situation in the US," the spokesman added.

In the US it is now estimated that Commodore has captured 43% of the $1.1 billion market for under-$1,000 personal computers. Its nearest rival, Texas Instruments, is estimated to have a 23% share of the US market, with Timex (marketing the Sinclair machines) only 9%.

In recent months, during a fierce US price-war, Commodore has broken ahead of its American rivals, many of whom — Atari, Texas and Mattel — have reported heavy financial losses.

Indeed, so damaging has the price cutting been to some that Mattel has indicated a wish to withdraw from the home computer market — and Atari announced in October losses of over $100m for the third successive quarter.

Commodore, surprisingly under these circumstances, has announced record annual profits, up to $91m on sales doubled to over $680m. Commodore chairman Jack Tramiel attributed the growth largely to "extremely strong demand for the 64".

In the UK Commodore has stepped up production of the 64 to try to ensure sufficient stocks for Christmas, but it already seems likely that demand may outstrip supply.

Precision offers database potential

SUPERBASE 64 is a new programmable database and information retrieval package for the Commodore 64 from Precision Software.

At its most straighforward Superbase 64 offers the user a menu-driven system within which individual record structures can be built up. The database can hold up to 15 files, each containing an unlimited number of records. Each record can contain up to 11,000 characters placed in up to 127 fields spread across four screens.

Within these constraints you can build up whatever record or file structure you wish.

However, with Superbase 64, you can go one step further. With the user-programmable interface part of the package you can adapt the database software to your own precise requirements using the Commodore 64 Basic in conjunction with 70 additional Superbase Basic commands: *Select, Find* and so on.

Says Precision's Peter Thomas: "You can build almost any specialist application you want. For example, if you want an accounting system you can build one with very little work."

In the next six months the company plans also to release a range of add-on software packs for Superbase 64, developed using the Basic extension — providing, to start with stock control and accounting.

Superbase 64 is available on disk, complete with a 200-page manual, priced at £99.95.

BY THE END of November Channel 8 Software should have completed conversion of all 10 Mysterious Adventures from Digital Fantasia for the Commodore 64. The 10 titles are all traditional-style graphic adventures written by Brian Howarth: The Golden Baton, Arrow of Death 1, Arrow of Death 2, The Time Machine, Circus, Feasibility Experiment, Escape From Pulsar 7, The Wizard of Akyrz, Perseus and Andromeda and Ten Little Indians. Each of the titles is priced at £9.95, available on cassette.

Rose blossoms at Phoenix

PHOENIX Software is a new games company set up by Gerry Rose, one of the founders of the predominantly Vic 20 software house Romik.

The new company has an interesting idea — it will sell two-cassette games containing both an arcade-style game and an adventure type program.

Before you can begin to tackle the adventure you must master the arcade game, giving you access to the loading code for the adventure. Also, clues for solving the adventure are revealed as the arcade game play progresses.

To begin with Phoenix has two titles for the Vic 20 and one for the Commodore 64.

In Four Gates to Freedom for the Vic you must first destroy the four gates which bar your way, before entering the catacombs of the planet Xzinos to rescue 20 scientists trapped in suspended animation.

In The Sorcerer's Apprentice for the Commodore 64 you must temporarily stop the brooms from fetching water. Then you venture into the sorcerer's castle in search of the spell to put paid to the brooms once and for all.

All titles are priced at £9.95.

The Six-Four Supplies Company is THE specialist for the Commodore 64. Our range of products in support of this machine includes a wide range of peripherals, devices and software to cover the needs of home and business user alike. We intend to offer an unrivalled selection of products, covering every aspect of using a Commodore 64.

SOFTWARE

The software list shows, in order: the product **name/producer**/product **type/price prefix** to indicate cartridge (r) disk (d) and cassette (c). These are fully itemised in our product sheets. Producers initials here simply identify like-named products for price checking. The product types are: accts:accounts; adv:adventures(3-D); bus:home-business; assembler (+utilities); bus:business; comp:compiler; data:datafile/base; dbu:database(code)writer; edu:educational; fn:financial; hfin:home finance; intf: interface lang:language/OS; madv:mystery adventure; mon(ia)(u):monitor (+assembler) (+utilities); ref:reference datafile; sadv:space adventure; sprd spreadsheet; stat:statistics; txed:texteditor; util:utility wp:wordprocessing; wpu:wordprocessing utility or link program. Indicated products are suitable for "serious" applications. Some prices may now be lower – credit given. Please specify choice of cassette (c), disk (d) or cartridge (r). Add 20p for p&p on orders less than £20, Europe £1.00 per item.

HARDWARE

Product	OUR PRICE*
(a) Commodore 64	£195.00
(b) 1530 cassette unit C2N	£40.00
(c) 1541 disk unit	£199.00
(d) 1525 printer	£199.00
(e) 1526 printer	£340.00
(f) Epson FX80	£410.00
(g) Parallel user port printer cable and software to connect (f) to (a)	£25.00
(h) 4-colour printer/plotter	£160.00

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(j) letter writer: (a) + (b) + (d)	£420.00
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And now . . . Revenge of the Mutant Camels

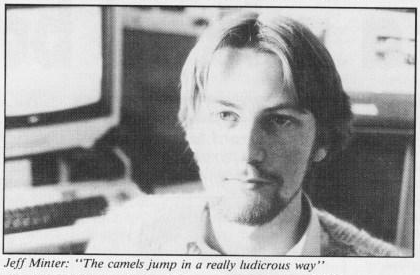
JEFF MINTER of Llamasoft is working on a new game for the Commodore 64 — Revenge of the Mutant Camels.

In it you take the role of a mutant camel, fighting back against the camel's defeat in Jeff's previous arcade action, Attack of the Mutant Camels.

You have three mutant camels with which to win your way as far as possible through more than 40 attack waves.

Each screen has a different theme — in Rocka and Roll-up you are attacked by huge boulders and mutant cigarettes. In other screens you meet mutant mutant camels(!), a figure called Eugene hurling axes and, worst of all, Manic Minter.

Your camels can fire in eight directions and can jump. Says Jeff: "The camels jump in a really ludicrous way and when they sit down they look very silly. It's great."



Jeff Minter: "The camels jump in a really ludicrous way"

The new 64 game should be finished by mid-December — price £7.50. Then Jeff will start work on his next Vic 20 game, the follow up to Megagalactic Llamas Battle at the Edge of Time.

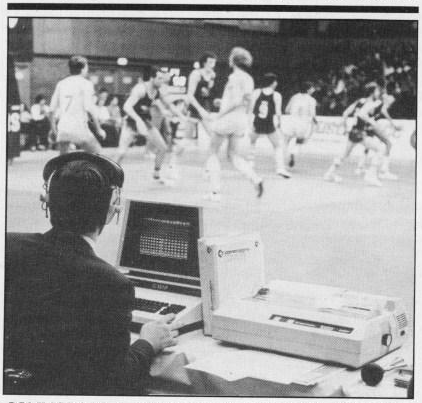
Corby factory in full swing

PRODUCTION of the Vic 20 and Commodore 64 machines is now in full swing at Commodore's new plant in Corby, Northants.

Over 5,000 computers a day are coming off the production lines, only eight months after Commodore announced its choice of Corby for the £20 million plant.

The new factory is the centre for European manufacturing of home and personal computers — one of four such sites worldwide — and machines from Corby are exported to the rest of Europe, Scandinavia and Africa.

At present the Corby works employs 160 people, but Commodore is currently negotiating a loan from the European Coal and Steel Community to allow expansion in 1984. This would more than double the numbers employed and push the number of computers manufactured per year at the site over the 3 million mark.



COMMODORE is certainly out to score points with British sportsmen — especially the basketballers. The English Basketball Association has netted a £70,000 two-year sponsorship from the company over the next two years. In the past Commodore has devised and operated a unique scoring program for the association which allowed information to appear instantly on the screen during TV transmission of games.

Cheaper printing

IF YOU are looking for an inexpensive printer option then Softex Computers in Bournemouth may have the answer.

For £20.95, the company is offering an interface and power-supply that will enable the low-cost Sinclair thermal printer to be used with the Vic 20 or Commodore 64.

Software supplied with the interface converts the Commodore character set into the dots printed by the Sinclair ZX Printer and provides a number of control commands.

Softex will also supply the package complete with a ZX Printer for £71.95.

Alice makes you wonder

ALICE in Wonderland is a new disk-based graphics adventure for the Commodore 64 that looks like setting the standard for future releases.

Following the story of the original Lewis Carroll book closely, the adventure takes the form of a sequence of sophisticated arcade-style games featuring an animated Alice figure.

What marks the game out are the cartoon-quality graphics and the continuous soundtrack of music.

Alice has been developed by a US software house and will be available in this country through Audiogenic. No date of arrival or price have yet been set.

Stack promises all the fun of the fair

THE STACK Light Rifle is a new idea for the Vic 20 and Commodore 64.

The rifle, when connected to the computer running specially developed software, can be used to "shoot" targets on-screen.

The device detects a hit or a miss by comparing the time the trigger is pulled with the time the tv takes from starting a scan to reach the point you are aiming at.

When the tv scan reaches the point on the screen at which the rifle is aimed, light from the tv activates a light-sensitive cell inside the rifle barrel.

The rifle will only work with software written specially for it. So far Stack developed six titles: Rats and Cats, Crow Shoot, High Noon, Glorious Twelfth, Escape from Alcatraz and Big Game Safari.

The Stack Light Rifle will be available from mid-November and is supplied, complete with three games titles, at a price of £29.95.

If you think you've something newsworthy, call 01-437 4343 and let us know

Commodore brings out a mixed batch

SOFTWARE REVIEW

***Pete Gerrard** takes a long, hard look at the software Commodore itself puts out*

COMMODORE Business Machines are more usually known for their hardware than their software, but this month sees the start of a determined campaign on their behalf to break into this lucrative market.

We've picked out some of their games for both the Vic 20 and Commodore 64, and to get the ball rolling we'll start with the 64 side of things, and the ludicrously named MaggotMania.

This Commodore 64 game is supplied on cassette, and although you have the option of using either a joystick or the keyboard to control the game's events, those of you with less than 20 fingers would do well to use a joystick.

Like so many other games this one falls into the category of versions on a theme, as it is nothing more than a poor impersonation of the arcade favourite Centipede.

Garden defender

For those unfamiliar with the genre, Centipede (and MaggotMania) cast you in the role of defender of the garden, a sort of Buck Rogers meets David Bellamy, who has to fight off hordes of maggots, spiders and snails. The maggots are merely intent on eating you, and waltz their way about the screen cannoning off any flowers that happen to get in their way.

You, being a lesser creature, cannot cannon in the same way, as any collision on your part with a flower results in the loss of a life. Spiders enjoy similar luxury to the maggots, and they make occasional forays into the garden in the hope of bumping you off.

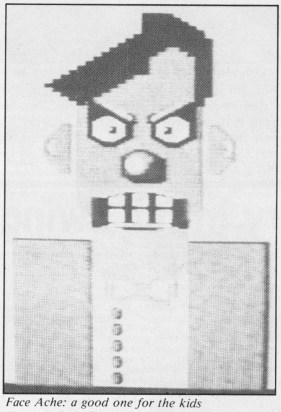
The snails aren't particularly dangerous, and provide you with a 1,000 point bonus should you hit one before it destroys too many flowers.

In action it's a none-too-inspiring version of an arcade favourite, and on the 64 comes out looking more like a shoddy version of the rightly popular Gridrunner, from that company obsessed with Llamas.

Your little creature is confined to the bottom few rows of the screen, and when some of the maggots inevitably get past you, they race about at breakneck speed in a frantic effort to collide with you and thus lose another of your lives.

Response from the joystick is quite reasonable, but overall the sound and use of graphics are merely hinting at the power of the 64, and are by no means using anything other than a fraction of the capabilities provided.

A poor game, considering what could have been done. Stick to the arcades, if you like demolishing maggots, spiders and snails: a gastronomic delight.



Face Ache: a good one for the kids

Jupiter Lander, a familiar-sounding title from the dawn of computer games turns out to be another flop. In its current guise, after appearing under names such as Lunar Lander in the early Pet days, it first appeared on the Vic 20.

Little excitement

The version produced for the 64 has hardly changed at all from the Vic version, and is as boring now as it was then. About as exciting as making toast.

The object of the game is to land a spacecraft on the surface of the planet Jupiter, a surface which has strange platforms on it, with bonus scores written on them. Carl Sagan, eat your heart out.

Using either joystick or keyboard, you have to manoeuvre your spacecraft left or right, and your only other control is over the thrust of the rockets.

A delicate hand on the controls is required as initial experiments with the game left me failing the NASA initiation test and taking giant leaps into outer space again. Jupiter seems a bit too big to miss altogether, but when your only control is a joystick, it's all too easy.

This game is boring. The initial screen shows three platforms on the surface of the planet, which give you either 2, 5 or 10 times bonuses for achieving a successful landing. When you near the top of one of these platforms the screen image expands, and a single platform fills up the entire playing area.

Unless you're an extremely dab hand at controlling the joystick, and manage to land at precisely the right speed, exactly in the middle of the platform, it's back to the launch pad as another ship bites the dust.

Once you have got the hang of it all, the game ceases to lose whatever minor interest it might once have held, as there are no additional hazards, no speeding up of the action, and no changes. You just keep on landing on the planet, then going back for another go again.

The one virtue of this game is that it is supplied on a cartridge, so you won't waste several minutes waiting for it to load.

Send in the clowns

Clowns: At this stage, after ploughing through the first two games, this amply summed up my opinion of Commodore for bothering to put them onto the market at all.

But Clowns did at least manage to restore some of my faith in their ability to write computer games even if, like so many other games, this one is about as original as most of the music in the current top 20.

Clowns first appeared for the Commodore Pet back in 1979, and once more this new version for the Commodore 64 (supplied in cartridge format again) has added very little to the original game.

You control a little clown on a see-saw who has to balance it under another clown who has, kamikaze-style launched himself into space from one of the four platforms on the edge of the screen.

If you manage to position this see-saw correctly, the impact of the clown landing on it sends another clown soaring towards the top of the circus tent (otherwise known as the top of the screen) where, Yosser-like, he has to nut one of a succession of balloons passing across the top.

There are three rows of balloons, in different colours just to show that the Commodore 64 has got colour, and clearing whole rows of balloons rewards you with various bonuses. Each balloon is also worth a few points, depending on its colour.

One thing that is noticeable about the packaging purely by its absence is a warning saying that this game requires the Commodore games paddles in order to play

it properly. No joystick controls, no keyboard controls, so unless you're one of the very few people who have a set of paddles, this will not be one of your most interesting games.

Once you do get started it is actually quite addictive, as your little clowns hurl about the screen, leaping up and down on the see-saw and nutting all the balloons that they can find. The action gets faster as you progress, although you can get a satisfying high score by hardly moving at all, once the rhythm has built-up.

To conclude, quite fun, but ultimately one has to say that the 64 deserves better than this. And they should have said something about those paddles!

Join the rat race

Radar Rat Race — a game about commuting perhaps? No, no, this one puts you in the guise of a blue rat, being chased by a horde of red rats, gobbling up cheese as you move around the screen, and attempting not to bump into any of the deadly cats the lurk about.

The screen display is quite imaginative. The left-hand side of the screen shows only a part of the entire maze in which you find yourself. The right-hand side contains all the details of the scores, bonuses, lives left and so on, together with a miniature map of the whole maze, showing where all the cheeses are to be found.

Since your little blue rat requires a lot of cheese before he can progress to the next level, this comes in quite handy. Of course, one could say it is there to make the programmer's life easier when controlling sprites, but that would be uncharitable.

Once again this comes in cartridge form, and this is much to be preferred to tapes or disks. It's much more reliable, and takes just seconds to install.

Using a joystick as your control, the action is fast and furious, as the chasing red rats (three on the first level) show an uncanny ability to find and chase after you. They can be put off the scent for a while by spraying a smoke screen behind you, but you've only got a limited amount of smoke, so be careful.

One of the lumps of cheese is a special one, which doubles the score you get for eating any other bit of cheese. At least, it does until you lose a life.

Getting through one level brings you to screen two with four rats after you. Getting through this one brings you to the manic speed run, where you have the entire time allowance (not very generous) to eat all the cheeses before five supersonic red rats come after you. When they start, you have no chance! They move at least twice as fast as you can, so you might as well desert the sinking ship and start another game immediately.

It is a good game, and certainly the best of Commodore's 64 bunch.

Face Ache could be the result of playing too many games in one day, but in real life it is a family entertainment game for the Commodore 64.

Back to cassettes for this one, and after waiting nearly seven minutes for the game to load, you really appreciate cartridges.

The time spent waiting can be filled up by reading the nauseatingly condescending information sheet supplied with the tape. This describes the action in words of few syllables, and in precis you are told that the screen will fill with a hilarious collection of faces. After you've managed to control your hysterical laughter, which isn't too difficult, the game proper commences.

Once again the comment has to be made that, for a graphical machine, this program does little to show you any of the features available, as everything is done in suitably chunky graphics.

Memory test

A face will appear on the screen, and after five seconds disappear again. From memory you then have to recreate the screen face using a variety of commands.

Separate keys control the hair, eyes, nose and chin, and using a combination of the lot you have to redraw the earlier face. A good memory tester with the reviewing team frequently scoring less than half marks when producing the face. However, by the time you've drawn up half a dozen different gargoyles on the screen, the interest begins to wain, and the fingers look elsewhere for something different to do.

A good game for the tinies amongst us, and, as a memory tester, it does have a role to play in the educational world. But first they would have to re-write the instructions, which really are quite dreadful, and perhaps do something about the graphics. They are reasonable, but the 64 could do better. Half marks for trying.

With Sea Wolf it is back to cartridges again, and just as well, otherwise a few more minutes would have been wasted.

I despair of software companies at times, and with this program being the result of a joint venture between Commodore and the electronic genuis of Bally, responsible for many of our best arcade and pinball machines, there is really no excuse.

Quite simply this is appalling, and why anyone wasted money on getting it onto the market is beyond me. You are in charge of a static submarine glued to the bottom of the sea and screen, handling a limitless supply of torpedoes to shoot up at the ships passing above. Different sizes of ships score different points, and needless to say the smallest, fastest ships get you the greatest points.

Paddles needed

There is a time on the game although this can be changed if so required. Once again you have to use a set of paddles, as there are no options for keyboard or joystick control of either of the submarines in this two-player game.

I tried hard to find a redeeming feature in the game, I really did, but there just isn't one. All you have to do is sit at the bottom of the sea and launch torpedoes up at the never-ending parade of enemy ships above.

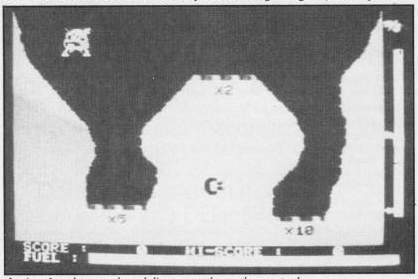
There is no radar control, no movement of your submarine, no decent sound effects, and better graphics were achieved on the earlier Commodore Pet versions of the same game (sans colour of course).

One could go on, but why bother? If this is Commodore's attempt to attack the software market, they're in for a lean winter.

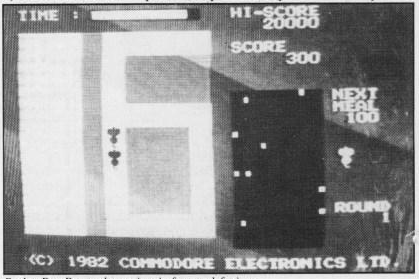
Commodore have also a series of arcade games for the Vic 20, some old, some new, but the over-riding impression of the games is that they are much better than Commodore's own games for the Commodore 64! Why, why, why?

Cosmic Jailbreak, based on the arcade game of the same name, first appeared as a Pet game in 1980, written by one Derek Hipkin. Whether he is the author of this Vic version I don't know, but this is a faithful reproduction of that Pet version.

Supplied on cartridge, you can use either the keyboard or a joystick to control the action, and for once the keyboard is just as easy to use. You are a little spaceship at the bottom of the screen who can move left and right, and who has the job of guarding a prison deep in the depths of outer space. ▶



Jupiter Lander: needs a delicate touch on the controls



Radar Rat Race: the action is fast and furious

◀In this prison are three offending aliens, and they are surrounded on all sides by rows and rows of bricks. But, there is a jailbreak a-comin' as hordes of other aliens are lined up in formation at the edges of the screen, intent on nipping in between your fire and stealing the bricks of the jail, one at a time.

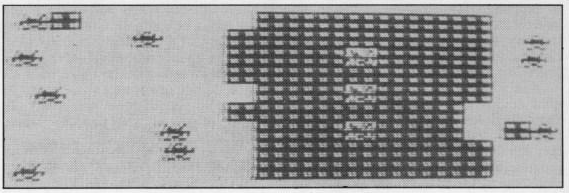
As they move back and forth they are also firing at you, and your three Space Invader type defences soon begin to crumble under the onslaught.

Occasionally one of these aliens will go beserk, and while the rest stand still will run about like an alien possessed, stealing bricks at a rapid rate. A mysterious mother ship also appears from time to time at the top of the screen. High bonuses can be achieved by zapping this one into cosmic debris.

Everything goes along at a nice lick, and by the time you arrive at level three yet more things begin to happen. Between levels the jail may or may not be rebuilt, depending on how many lives you've got left, and how many prisoners are still in the jail.

On the third level, an earwig appears directly above you, and he can only be killed by shooting him at the edge of his body. By the fifth level, a veritable chorus line of aliens is dancing above your ship, and when you eliminate all five of them, the entire lot reappear and start bobbing about again.

This is a superb game, with so much happening. Supplied on cartridge, it deserves a place in every game player's collection.



Cosmic Jailbreak: a superb game giving lots of action for your money

Omega Race is another fast action, destroy everything that moves and everything that doesn't space game for the Vic 20. Cartridge form again, and you'll need a joystick or a set of games paddles to play this one.

A nice opening feature is that you can change the background and foreground colours of the action. This could be very useful on some sets, as too many Vic games seem to appear in the strangest combinations of colours that generally render something on the screen as being totally illegible.

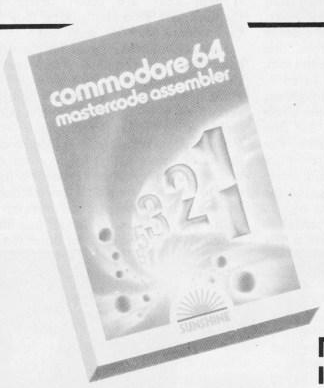
If you get it wrong with Omega Race you've only yourself to blame. Once you start playing you really do have to destroy everything. In the centre of the screen is a rectangular block which you can't penetrate, and underneath that is sitting a horde of aliens, just waiting to get you.

Controlling your spaceship is, to say the least, difficult. Once you've started moving in a given direction, stopping and changing direction is virtually impossible, and you just have to sit and wait while your ship blunders serenely around the screen, cannoning off walls and the block until it finally comes to a rest. That's inertia for you.

While you blunder about, the aliens come after you, and there are a number of different types of nasties, each with their own little trick up their little alien sleeves.

This game is fun, and even if you do start blithely bumping into things, it should at least provide a few laughs along the way.

By the time you've worked out how to control the ship properly (30 games later), the game does begin to make more sense, and you can get on with the job of saving the universe. Zapping different aliens generates different scores, and everything, as usual, just gets faster and faster as it goes along from level to level. Another good arcade game for the Vic. ■



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All the pleasures of printing — and some of the pain

***Pete Gerrard** assesses the range of printers on offer for Commodore users, from daisywheels to dot matrix models — and offers some advice to insomniacs*

ANY COMPUTER that takes itself at all seriously can be connected to a wide variety of printers, covering such diverse interfaces as IEEE, RS232 and Centronics.

However, earlier Commodore computers, before the company launched into the home market with Vic 20s and Commodore 64s, were blessed with a peculiar version of an IEEE interface. While a smart purchase would give you the opportunity of linking up to many standard IEEE printers, it would also leave you £25 worse off. A little bit more expenditure could expand your world to include a veritable host of RS232 and Centronics printers, and we'll be taking a look at just some of the printers currently available later on in this article.

Slow, slow . . .

Of course, you could always use Commodore's own printers, ranging from a (relatively) inexpensive dot matrix printer to a (not-so-relatively) expensive daisywheel printer. The speed of the latter devices must have left many people thinking that they could type faster themselves.

Owners of Commodore 64s and Vic 20s were in a less fortunate position, in that the interface provided on those two computers was compatible with nothing other than Commodore's own peripherals. The dot matrix printer issued by Commodore itself is not only incredibly expensive, but also very slow in operation, and very, very noisy.

Enterprising manufacturers, ever quick to make a fast buck or two, have produced a whole collection of interfaces which allow your humble home computers to connect up to all of the interfaces mentioned earlier. But beware, interface buyers, not every connector will work with every piece of software. Word processors, one of the primary reasons for acquiring a printer in the first place, are very fussy about which interface you use, so insist on seeing a working demonstration before buying.

The type of printer that you get will be largely determined by the work to which it will be put. It it's use is to be primarily private, producing listings and internal reports, the chances are that you'll be able to get away with buying nothing more than an ordinary dot matrix printer. The quality of the output won't be too great, but it will certainly be legible, and a good dot matrix should be able to whizz along at speeds well in excess of 100 characters a second.

. . . quick, quick . . .

If the printed material is to be seen by anyone other than yourself, for instance, in a company using the printer as part of a word processing system, you'll probably have to spend rather more money and be prepared to put up with a slow, but high quality, daisywheel printer.

Some of the devices now available allow you to mix these two print types to a limited extent, in that they will normally act as a dot matrix printer, but can, with a ▶

Some of the range at Triumph Adler — which offers one of the cheapest daisywheel printers along with dot matrix models

◀technique known as double striking (literally, printing the image twice), produce a reasonable impersonation of the type of output more commonly associated with a daisywheel printer. As ever, you pay your money and take your choice.

Few printers, other than Commodore's own, will allow you to reproduce the graphics character sets found on the actual computer, although most of them will allow you to define characters and produce, for example, dot by dot copies of the screen. However, this requires some software to be written by you, the user, so we'll stick to straightforward printers, starting with the DRH 136, which can operate in either RS232 or Centronics modes.

Incidentally, all of the printers listed here can be used with any of the Commodore range of computers. You'll just have to get the interface appropriate to your own machine.

The DRH 136, which is distributed by Triumph Adler (27 Goswell Road, London EC1), is a 120 character per second (abbreviated from now on to CPS) printer, with the ability to print bi-directionally. The number of characters printed per line is software selectable, and can range from 136 to 224, although this latter mode is the type that requires an extremely powerful magnifying glass.

. . . slow

All sorts of character sets are available with this printer, but at a price of £675, you may care to take a look at the slower, but cheaper, DRH 80/81. Again from Triumph Adler, this is down to 80 CPS and £540. Apart from having only a 140 column line at maximum, the other real difference between this machine and it's big brother, the DRH 136, is the print speed. And, of course, the price.

Cheaper still, at £498, is the Facit 4510 from Facit-Addo (Maidstone Road, Rochester, Kent ME1 3ON). This is a 120 CPS dot matrix printer, with a column width of up to 80 characters, which is switchable down to 12 columns, should you so desire it. There's quite a wide range of character sets available, and also a number of different print modes, including condensed and compressed. This can be linked up to either Centronics or RS232 interfaces.

The next lot of printers are by Epson (Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH). Epson has long been known for producing good, cheap, dot matrix printers, and its latest couple of models have done nothing to harm that hard-earned reputation. Their one failing perhaps is the ludicrous combinations of letters they go under. Thus we get the RX-80-FT, which is closely related to the FX80, which in turn relates to the MX series of printers, and so on. Why can't they just have names?

Anyway, carping aside, the aforenamed RX-80-FT is a 100 CPS printer with a variety of typefaces and sizes, supplied with a Centronics interface (although this can be converted into either IEEE or RS232 if required), and capable of taking either friction feed or tractor feed.

At just £319, this is worth considering, as is its slightly more expensive big brother the FX80. This costs £438, but has the ability to print at almost twice the speed (160 CPS), and produce near letter quality output, as it's possible to double strike everything. Out of all the printers looked at here, the FX80 has got to be a personal favourite. I've owned one for a number of months, and have yet to find a problem with it. The range of commands is, at times, superior to the range of commands on the computer that's driving it! A fine printer, with an excellent manual.

Possibly the fastest dot matrix printer that is readily available for any Commodore computer is the DRS 250, again from Triumph Adler. This races along at the amazing speed of 250 CPS, and comes replete with either an RS232 or a Centronics interface.

However, if the computer that you happen to own is a Vic 20 or a Commodore 64, there seems little point in paying around £200 for a computer, and then another £1,495 for the printer to go with it. Personally, when the printer costs seven times as much as the computer, I feel that the time has come to go elsewhere. If you're extremely rich, obviously the DRS 250 has a lot to recommend it. If you're like the majority of us, it's either bankruptcy — or try the Epson FX-100. This is the latest and greatest dot matrix printer to come out of the Epson stable, if the specification sheets hold true.

At £569, the FX-100 has everything that the FX80 has, including the 160 CPS print speed, optional interfaces of every kind, and superb graphical facilities, but it also has a much wider carriage. A sleek little number, it should sell by the thousand.

Many companies seem to make a living out of impersonating Epson printers, and indeed the early Commodore printers for the Pet range of computers were cut-down versions of Epson models. This is not a bad thing (imitation is the sincerest form of flattery, and all that), but should check whether the printer you're thinking of buying isn't already available from Epson, at a much cheaper price.

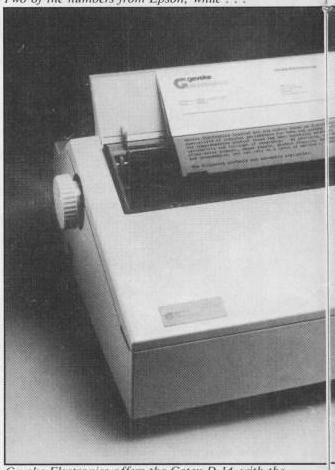
Small type

But we digress. When examining specification sheets for printers, obviously they will all try and charm you with a wonderful range of capabilities. Most printers, however, do have a failing somewhere along the line, and this is either not mentioned, printed in minuscule type, or disguised in some way.

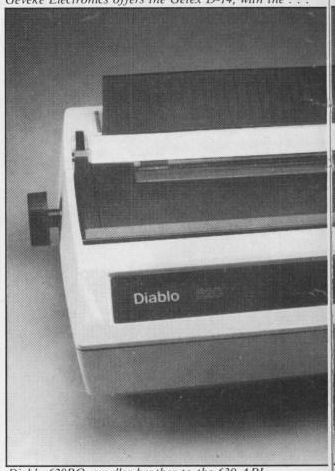
The most common failing is in speed of printing, and a phrase often used by manufacturers to hide a slow print speed is the term lines per minute, instead of characters per second. By using LPM instead of CPS they can still put down a large number, and hope that most people won't think it to be a slow printer. While 55 LPM sounds quite good, remember that a line is typically 80 characters across, and that 80 times 55 equals 4,400 characters per minute (73 CPS). This is not quite as fast as it first sounded.

All this is by way of introducing the

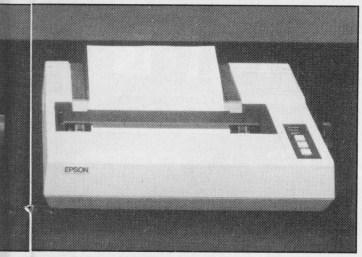
Two of the numbers from Epson, while . . .

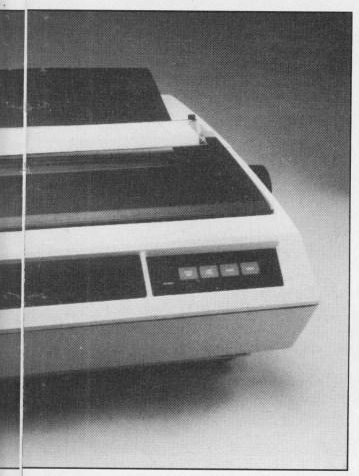


Geveke Electronics offers the Getex D-14, with the . . .



Diablo 620RO, smaller brother to the 630 API





Integrex CX 80, which looks like an early Commodore printer, prints at the aforementioned 55 LPM (although to be fair it can print at 125 CPS in certain special cases, like printing line after line of the same character), and with a Commodore-compatible IEEE interface will set you back some £845.

As a pure graphics printer it has many advantages over other conventional dot matrix printers, because it has a choice of seven different colours to print in, and a dot-addressable print facility. However, program listings in high resolution printed in seven different colours tend to look a little odd. Unless your need is a highly graphical one (in which case contact DN Computer Services, West Croft Industrial Estate, Manchester Old Road, Rhodes, Middleton, Great Manchester M24 4PJ), we'll go back to ordinary printers, and look at a little number from Mannesman Tally.

Mannesman was at one time supplying Commodore with printers, although I believe that agreement was discontinued a while ago. Still, it is continuing to produce the MT80, which is a £799 Commmodore-compatible 80 CPS dot matrix printer. Mannesman seems to have gone all out to be compatible with anything else currently available, as the MT80 can handle all the Epson codes, as well as having a number of its own. Any one of a million different interfaces (well, quite a few) can be hooked up to this one. It is also very quiet, a boon if you happen to be next to the thing all the time it's working.

Daisywheels

But enough of dot matrix printers. One at least in the above collection should suit most people. As many people using Commodore computers for pleasure will probably also use them for business, so we'll turn our attention to some of the daisywheel printers currently available.

All of these will work with a Commodore 64 or Vic 20, provided that a suitable interface is connected (eg the Interpod — which comes from Oxford Computer Systems, Hensington Road, Woodstock, Oxford OX7 1JR). But as most of them cost upwards of a thousand pounds, they will probably be of most interest to the business user. Still, if you own one of the home models and fancy a little bit of letter quality printing, read on.

One thing that just about all daisywheel printers have in common is that they are s-l-o-w. Thus their primary use would not be in producing program listings, but in printing out letters, reports, memos, etc. You don't buy a daisywheel printer to list out adventure programs.

Triumph Adler, encountered earlier when talking about dot matrix printers, produces possibly the cheapest daisywheel, the TRD 170-S, which costs £725. This is not the fastest of printers, at just 17 CPS, but it is of a high quality, and it is also quiet. A maximum of 198 extremely small characters can be printed across a line, and with a whole range of optional interfaces, covering Centronics, Qume and RS232, it should be able to link to just about anything.

Faster, at 55 CPS, but more expensive at £1,675, is the DWP 5055, from the same company. Millions of advanced features, including double print, bold print, underlining, printing up to 163 characters a line, and so on, make this a versatile and fast daisywheel printer. Not many models under 10 grand will print as fast as this one will.

Many-coloured dreams

A company down in Woking is producing a whole range of daisywheel models, including one at just £475. However, the Getex D-14 won't win any sprints, as it produces its letter quality output at the yawn-inducing rate of 13 CPS. Still, you can print in either red or black, and a large print buffer compensates somewhat for the slow speed by freeing the computer to get on with some more work while everything is being printed out.

The D-14 comes from Geveke Electronics (Vale Farm Road, Woking, Surrey GU21 1DW), as does the Diablo 620 RO at £975 and the Diablo 630 API at £1,650. These two are fairly similar, printing at 25 CPS and 40 CPS respectively, and including various font sizes, character widths, margin controls, and so on. RS232 interfaces are available on both models, but the latter scores in its graphic abilities, as it incorporates Diablo's Hyplot vector plotting — useful for all those business programs that churn out bar charts and histograms at the drop of a byte.

Many other daisywheel printers are available, including the Olympia ESW 3000 RO, from Intelligent Interfaces (436 Wood Street, Stratford-on-Avon, Warwickshire CV37 6JQ) at £1,136. Smith Corona is another commonly encountered name, and its extremely cheap (£346) 120 words a minute TP-1 model has already found a few friends. This can be obtained from Discom Trading Company, Dresden House, 51 High Street, Evesham, Worcestershire WR11 4DA.

Finally, at a shade under £4.), is the Bytewriter (at last a printer with a name), from the same Discom Trading Company. This normally comes with a Centronics interface, although you can get a Commodore-compatible IEEE interface fitted if desired. Although it has a slow print speed of just 8 to 12 CPS, it has one feature which is truly amazing at this price. It is also a typewriter, having a full travelling keyboard fitted to it. Since it only weighs 21 pounds, it also becomes portable rather than transportable.

I've covered a reasonable range of printers, from the surprisingly cheap to the eyebrow-raising expensive, with print speeds going from snail's pace to hare's pace. The rest is up to you.

One final word of warning about going to buy a printer. They are expensive, usually costing more than the computer, so you're entitled to a little bit of extra help from the shop. Demand to see a working version of the set-up that you will be using, including all the interfaces and all the software, before parting with your hard-earned cash. Only that way will any last-minute problems come to light. ■

Cross the minefield at your own risk

PROGRAMMING

***Pete Gerrard** steers Vic 20 owners through the minefield of programming*

ONE OF THE more commonly recommended ways of learning to program is by studying someone else's programs, and adopting any useful techniques that they might have used. We can follow that procedure by looking at a games program for the unexpanded Vic 20.

The game is called Minefield, and the object of the game is to guide a little blob across a 9 by 10 square grid. Some of the squares on the grid have mines in them, and walking into such a square will result in instant destruction!

Rusty radar

You are equipped with a rusty radar that allows you to scan the immediate area around you. If there is a mine within one square of your present position, this information will be displayed at the top of the screen. However, it's up to you to determine which square the radar is indicating.

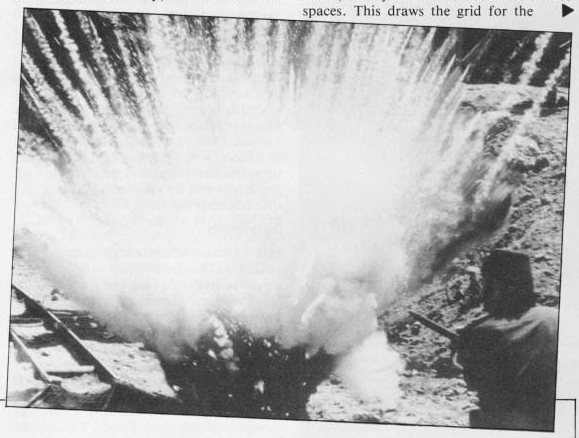
Getting successfully across the grid will send you onto the next level where there are even more hidden mines. And so it goes on, with more mines appearing all the time, until the inevitable happens and you meet your doom.

The program can be broken down into several main chunks, and the first 10 lines just clear the screen, tell you who to blame for the program, set the screen and border colours, and then go into displaying the instructions on the screen before dimensioning an array M(10,11) in line 10. This array will hold the mines information.

Line 20 contains the level counter L, and the variable J, which determines your position on the screen relative to the start of the screen memory, which on the unexpanded Vic, starts at location 7608.

Lines 30 to 50 need some explanation as the printer used to produce the listing can't reproduce Vic graphic symbols. Line 30 consists of PRINTing within quotes a space, then shifted C, then a space, then shifted C, and so on, until you have 9 spaces and 9 shifted Cs. Line 53 is exactly the same as line 30.

Line 40 is PRINTing within quotes a shifted B, a space, a shifted B, a space, and so on, until you have 10 shifted Bs and 10 spaces. This draws the grid for the ▶



```
 1 PRINT"[CLR]"
 2 REM ********************
 3 REM * BY PETE GERRARD *
 4 REM ********************
 5 POKE 36879,8:REM SET SCREEN AND BORDER
 8 GOSUB 2000:REM RULES
 10 DIMM(10,11):REM ARRAY FOR GRID
 20 L=L+1:J=441
 27 PRINT"[CLR,WHT]"
 28 FORI=1TO10:REM PLOT GRID
 30 REM SEE ACCOMPANYING ARTICLE FOR DRAWING OF GRID
 40 REM MORE GRID DRAWING
 50 NEXT
 53 REM AND THE BOTTOM LINE OF THE GRID
 55 IFEOG=1THEN RETURN:REM END OF GAME
 56 POKE 7680+J,102:POKE 7680+61,42:X=2:Y=2:REM PUT YOU ON GRID
 57 FORI=1TO4+L*3:A=INT(RND(.5)*9):B=INT(RND(.5)*10):M(A,B)=1:REM GENERATE MINES
 58 IF(A=0ANDB=0)OR(A=9ANDB=10)OR(A=1ANDB=0)THEN M(A,B)=0
 59 NEXT
 60 IFX=10ANDY=11THEN5000
 61 GOSUB 1500
 62 Q=J
 64 GETP$:IFP$=""THEN 60:REM MOVEMENT
 70 IFP$="I"THEN1000:REM UP
 75 IFP$="M"THEN1200:REM DOWN
```

Continued on page 20

TERMINAL SOFTWARE

commodore 64 games cassettes

SUPER SKRAMBLE!
Personal Computer News (15-21 Sept '83) gave SUPER SKRAMBLE! an overall rating of NINETEEN OUT OF TWENTY and described it as: "Well implemented with beautifully smooth scrolling and very nice graphics."

SUPER GRIDDER
"... a compelling piece of frivolity that could give hours of fun." was the verdict of Personal Computer News (22-28 Sept '83).

SUPER SKRAMBLE!
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◀ game onto the screen.

Line 56 positions you on the grid, and places an asterisk in the top right hand corner of the grid: this is the spot that you're aiming for.

Lines 57 through 59 are generating the positions of the mines on the grid by producing random numbers in the range 0 through 9 for the X-direction, 0 through 10 for the Y-direction, and then storing those X,Y random numbers into our M(10,11) array by putting a value of 1 into the array where the co-ordinates meet. A 0 in the array means that there is no mine at that location.

Line 60 is a universal check to see if you've reached the top right hand corner of the grid. Lines 64 through 90 check for pressing of one of the four movement keys, and going to the REMmed subroutine to process moving up, down, left or right.

All of these moving routines are the same in that they start by checking for the validity of a move to ensure that you don't go over the borders of the grid. They then update your position on the grid and POKE your new position onto the screen using the J variable offset from the start of screen memory at 7680. Your old position is indicated by a dot on the screen, positioned using the variable Q.

Bomb search

The next step is to update your X or Y co-ordinates on the grid, before going to the bomb checking subroutine starting at line 1500. This checks the X and Y co-ordinates of all the surrounding squares for the presence of a bomb by using the original M(10,11) array and seeing if any of the surrounding X,Y co-ordinate squares contain a 1, or in other words a bomb.

Line 1502 checks to see if you're on a square with a bomb in it. If you are it's off to line 3000 and a message that tells you you're dead, before showing the offending bomb's position on the grid.

If you managed to reach the corner of the grid, the routine starting at line 5000 informs you of your success, updates the level counter L (so that we can have more bombs), and then re-sets all the bomb locations to 0, before going back to line 20 and coming up with some new bombs.

The main things to look at in the listing are the way that the grid is handled and the way that the surrounding squares are checked for the presence of a bomb. The use of the array M(10,11) to hold the bomb information and the use of the X and Y co-ordinates provides most of the lessons in this short program.

Other things to see are generating random numbers (line 57), checking that the bomb is not placed on either the starting square, one of the squares next to it (in which case you could never start the game), and the end square, all of which is done in line 58, and the handling of key pressing in lines 64 to 90. You should also have a fun game at the end of it!

This is a special Vic 20 adaption of the original Minefield game for the Commodore 64, as published in *Using the 64*, author Pete Gerrard, publishers Gerald Duckworth. ■

```
80 IFP$="A"THEN1400:REM LEFT
85 IFP$="D"THEN1600:REM RIGHT
90 GOTJ 64
1000 IFJ<66THEN60
1020 J=J-44:POKE7680+Q,46:POKE7680+J,102
1022 Y=Y+1
1025 GOSUB 1500
1040 GOTO60
1200 IFJ>412THEN60
1220 J=J+44:POKE7680+Q,46:POKE7680+J,102
1222 Y=Y-1
1225 GOSUB 1500
1240 GOTO60
1400 IF INT((J-1)/22)=(J-1)/22THEN60
1420 J=J-2:POKE 7680+Q,46:POKE 7680+J,102
1422 X=X-1
1425 GOSUB 1500
1440 GOTO 60
1500 REM CHECK FOR BOMBS
1502 IFM(X-2,Y-2)=1 THEN3000
1510 X1=X+1:
1511 IFM(X1-2,Y-1)=1THENB1=B1+1
1512 IFM(X1-2,Y-2)=1THENB1=B1+1
1513 IFY<3THEN1515
1514 IFM(X1-2,Y-3)=1THENB1=B1+1
1515 X1=X
1516 IFM(X1-2,Y-1)=1THENB1=B1+1
1517 IFM(X1-2,Y-2)=1THENB1=B1+1
1518 IFY<3THEN1520
1519 IFM(X1-2,Y-3)=1THENB1=B1+1
1520 X1=X-1:IFX<3THEN1570
1521 IFM(X1-2,Y-1)=1THENB1=B1+1
1522 IFM(X1-2,Y-2)=1THENB1=B1+1
1523 IFY<3THEN1570
1524 IFM(X1-2,Y-3)=1THENB1=B1+1
1570 PRINT"[HOME]"B1"BOMB(S) 1 SQ. AWAY"
1575 B1=0
1599 RETURN
1600 IF INT((J+5)/22)=(J+5)/22THEN60
1620 J=J+2:POKE 7680+Q,46:POKE 7680+J,102
1622 X=X+1
1625 GOSUB 1500
1640 GOTO 60
1998 GETZ$:IFZ$=""THEN1998
1999 END
2000 PRINT"[CLR,WHT]WELCOME TO MINEFIELD!"
2001 PRINT"[CD]YOU HAVE TO FIND YOUR WAY ACROSS A MINE-"
2002 PRINT"FIELD, TO REACH SAFETYIN THE TOP RIGHT"
2003 PRINT"CORNER OF THE SCREEN"
2004 PRINT"[CD]YOUR RUSTY RADAR ONLY SHOWS MINES THAT"
2005 PRINT"ARE ONE SQUARE AWAY : TREAD CAREFULLY!"
2006 PRINT"[CD]USE 'A' TO MOVE LEFT, 'D' RIGHT, 'I' UP"
2007 PRINT"AND 'M' DOWN'"
2008 PRINT"[CD]PRESS 'SPACE' WHEN    READY TO START"
2009 GETSW$:IFSW$=" "THENPRINT"":RETURN
2010 GOTO 2009
3000 PRINT"[CLR]DESTROYED!"
3002 PRINT"[CD]PRESS 'SPACE' TO SEE  THE BOMBS"
3004 GETSP$:IFSP$=" "THEN3008
3006 GOTO 3004
3008 EOG=1:GOSUB 27
3009 POKE 7680+J,102
3010 FORA=0TO10:FORB=0TO11
3015 IFM(A,B)=1THENSS=A*2+1+(9-B)*44+44:POKE 7680+SS,81
3020 NEXT B,A
3040 PRINT"[HOME]ANOTHER GAME (Y OR N)"
3045 GETG$:IFG$="Y"THENRUN
3050 IFG$="N"THENPRINT"[CLR]BYE!":END
3055 GOTO 3045
5000 REM SURVIVED A LEVEL! ONTO NEXT ONE
5002 PRINT"[CLR]YOU WERE LUCKY ON     LEVEL ";L
5005 FORI=0TO10:FORK=0TO11:M(I,K)=0:NEXTK,I
5010 PRINT"[CD]BUT JUST PRESS 'SPACE'AND I'LL PUT YOU"
5020 PRINT"ON LEVEL ";L+1
5030 GETSP$:IFSP$=" "THENPRINT"[CLR]":GOTO20
5040 GOTO5030
```

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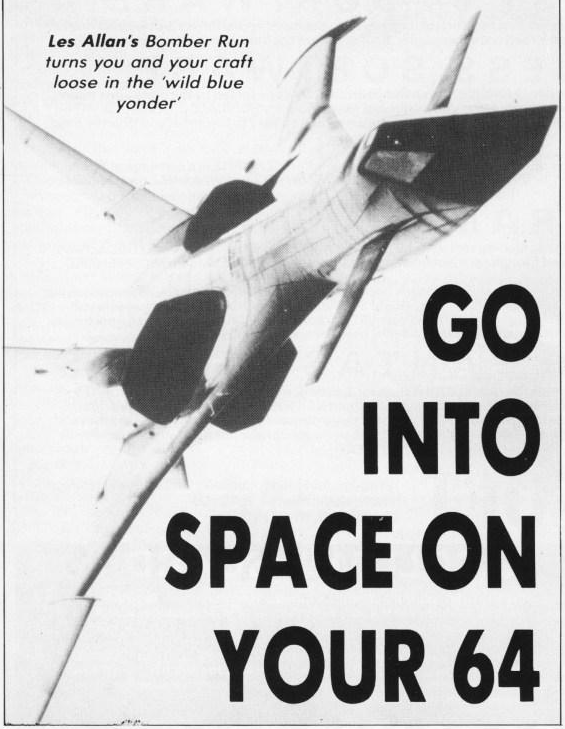
Les Allan's Bomber Run turns you and your craft loose in the 'wild blue yonder'



BOMBER RUN for the Commodore 64 utilises hi-resolution graphics to construct a random city scape and sprites to control the plane, bomb and clouds. The program gives the following options: joystick (port 2) or keyboard, skill level (1-5), and plane speed (fast-slow).

As the plane flies back and forth across the sky your bombs must destroy the city below to enable the plane to land, re-fuel and embark on another mission. After each successful landings your original flight path is restored and, when applicable, your skill level is automatically increased.

A score table routine is provided which lists the top 10 names against their scores. During this sequence the following options are available: fire button/space bar — return to game, F1 — change skill level, and F7 — quit game.

The program should be saved prior to running as pressing F7 activates re-set mode (SYS 64738). The program also self runs after 30 seconds.

The REM statements included in the program listing should be helpful pointers in understanding how the program functions. Due to the lowering of memory that takes place during the program only 153 bytes remain free. Therefore, they should be ignored during programming. Here is a brief listing:

Please note that standard abbreviations for Basic keywords must be used in order to satisfy some line lengths. These appear on pages 131 and 132 in the user manual.

Here are some further notes: the 64th byte is read but not used for sprite generation. The pointer for protected memory is memory start/256, ie POKE 52, 12288/256. The x co-ordinate of sprite (n) is controlled thus:

10 for x = 0 to 343
20 poke VC + 2,x and 255
30 poke VC + 3,y
40 poke VC + 16,int(x/256)*n
50 poke VC + 21,n
60 next

(This is a revised version of a program previously published in *Popular Computing Weekly*.)

```
0 DIMSC(10):DIMSC$(10)
2 VD=54296:WH=54276:RT=54277:HI=54273:LO=54272:SU=54278
4 D=0:G=0:CO=11:HS=0:LA=0:SC=0:VC=53248
6 FORX=1TO10:SC(X)=9:SC$(X)="BOMBER RUN 64":NEXT
8 A$="
10 B$="
11 REM #### SEE LINE 6000 FOR CC=1 COLOURS ####
12 C$="
14 CS=0:GOSUB8000:IFG=0THENGOSUB1000
16 GOSUB2000
18 CS=1:GOSUB8000:POKEVC+24,(PEEK(VC+24)AND240)OR14:POKEVC+31,0
19 REM #### SET UP SCREEN ####
20 PRINT"{CLR}{DOWN}SCORE";SC;"  HIGHEST SCORE";HS
22 FORT=1TO38:PRINTLEFT$(A$,24)RIGHT$(B$,2)"  ";:NEXT
24 FORX=3TO6:FORY=0TOINT(RND(1)*(14+SK)+1)
26 PRINTLEFT$(A$,23-Y)RIGHT$(B$,X)MID$(C$,(XAND15)+1,1)"{RVS}  {OFF}";:NEXTY,X
28 IFPV=45THEN32
30 PV=0:PW=5:BB=16
32 W=PX:V=PV:C1=INT(RND(1)*250+50):C2=344-C1:CL=INT(C1/256)+INT(C2/256)*8
34 POKEVC,C1AND255:POKEVC+1,69+LA*8:POKEVC+6,C2AND255:POKEVC+7,92+LA*8:POKEVC+29
9
36 POKEVC+2,XAND255:POKEVC+3,V:POKEVC+16,INT(X/256)*2+CL:POKEVC+21,11
38 POKEV0,1:POKER1,68:POKEWA,128:POKELO,7:POKEHI,126
39 REM #### MAIN LOOP ####
40 IFXC4THENDX=SP:W=W+8:POKE2041,192
42 IFXC256THENPOKEVC+16,PEEK(VC+16)ANDZ53
44 IFX>255THENPOKEVC+16,PEEK(VC+16)OR2
46 IFX>343THENDX=-SP:W=W+8:POKE2041,193
48 POKEVC+2,XANDZ55:POKEVC+3,V:POKEWA,129
50 PRINT"{HOME}"TAB(8)SCTAB(34)HS
52 IF(PEEK(VC+31)AND2)=2THENPOKEWA,128:GOTO700
54 IFWC8STHEN60
56 B$=B$+MID$(A$,SP
58 IFX>8ANDX<336ANDPEEK(KEY)=41ANDD=0THENGOSUB500
60 IFD>0THENGOSUB600:GOTO64
62 FORT=1TOSP*10:NEXT
64 POKEWA,128
66 IFX>296ANDV=213THEN70
68 W=W+DX:GOTO40
69 REM #### LANDING SEQUENCE ####
70 FORT=1TO5:POKE1936,131:FORTT=1TO250:NEXT:POKE1936,132:FORTT=1TO250:NEXT:NEXT
72 POKE1936,32:POKEVC+16,PEEK(VC+16)ANDZ53:POKEVC+21,PEEK(VC+21)ANDZ53:POKELO,0:
POKEHI,8
74 FORX=32TO314STEP2:V=242-180*SIN(X/200)
76 POKEVC+2,XANDZ55:POKEVC+3,V:POKEVC+16,PEEK(VC+16)ORINT(X/256)*2:POKEVC+21,PEE
K(VC+21)OR2
78 POKEV0,1:POKER1,16:POKEWA,129:POKELO,7:POKEHI,126
80 FORT=1TO10:NEXT:POKEWA,128:NEXT:POKEWA,128
82 POKEVC+16,0:POKEVC+21,0
84 D=0:PW=ABS(PX-344):PV=PV+8:BB=ABS(16-PX)
86 BP=INT(RND(1)*5+10)*SC/100)
88 PRINT"{RVS}{OFF}{TAB(11)}BONUS POINTS  "BP
90 PRINT"{RVS}YOUR PLANE IS RE-FUELLED AND READY !"
92 PRINTTAB(12)"{DOWN}                    "
94 PRINTAB(6)"PRESS 1 {RVS} TO START"
96 PRINTTAB(12)"
98 IFPEEK(KEY)<>1THENSB=SB+1:GOTO100
100 IFPEEK(KEY)<>2THEN100
102 SB=0:SC=SC+BP:IFHS<SCTHENHS=SC
104 LA=LA+1:IFLA=5THENSK=SK+.15:LA=0:PV=45:IFSK>1THENSK=1
106 GOTO18
108 IFSB>20THENPRINTTAB(13)"{RVS}M"
110 IFSB>40THENSB=0:PRINT"{UP}":GOTO94
112 GOTO98
499 REM #### BOMB STRENGTH ####
500 BV=X:BV=V+8
502 IFBX>255THENPOKEVC+16,PEEK(VC+16)OR4
504 D=INT(RND(1)*SP+SP/2)
510 RETURN
599 REM #### DEMOLISH BUILDING ####
600 B=(1064+(BX-16)/8+(BV-45)*5)
602 IFB1943THEND=0:GOTO610
604 POKEVC+4,BXANDZ55:POKEVC+5,BV:POKEVC+21,PEEK(VC+21)OR4
606 IFPEEK(B)<>32THEND=D-1:SC=SC+1:POKEB,32
608 IFPEEK(B+40)=129THENPOKEB+40,130
610 IFD=0THENPOKEVC+21,PEEK(VC+21)ANDZ51:POKEVC+16,PEEK(VC+16)ANDZ51
612 BV=BV+8
614 IFSC>HSTHENHS=SC
616 RETURN
699 REM #### CRASH SEQUENCE ####
```

Continued on page 24

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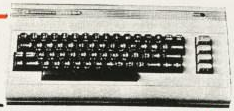

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```
700 POKEVC+16),PEEK(VC+16)AND251:POKE(VC+21),PEEK(VC+21)AND251
702 IFIRQ%THENPOKE2041,195
704 IFIXQ%THENPOKE2041,196
706 POKEVO,15:POKEBT,68:POKEBU,240:POKEWB,129:POKELO,200:POKEH1,40
708 FORV1=1TOBOSTEP-.25:POKEVO,V1:POKEVC+40,15-V1:FORT=1TO10:NEXTT,V1:POKEWB,128
710 POKEVC+40,CO:POKEVC+27,9
712 FORPV=VTO2138STEP2:POKEVC+9,PV:FORT=1TO10:NEXTT,PV
714 PRINT"■■■■■■TAB(10)"HARD LUCK  TRY AGAIN!"
716 FORX=15TO13STEP-1:POKEVC+32,X:POKEVC+33,X:FORT=1TO10:NEXT
718 POKEVC+17,11:FORT=1TO150:NEXT:POKEVC+17,27:NEXT
720 FORT=1TO1000:NEXT
722 POKEVC+21,0:POKEVC+16,0
724 CS=E-OOSUB300
726 POKEVC+24,21
728 POKE198,0
730 OOSUB5000
732 D=0:LA=0:PV=45:SC=0
734 OOT014
799 REM **** CLEAR/CHANGE SCREEN ****
800 PRINTCHR$(147)
802 POKEVC+32,CS:POKEVC+33,CS
804 RETURN
999 REM **** SET UP GAME START ****
1000 PRINTCHR$(147)
1002 PRINTLEFT$(A$,7)TAB(7)"■DO YOU WANT JOYSTICKS  Y/N"
1004 P=PEEK(197)
1006 IFP=2ETHENKEY=56328:K1=111:K2=127:D#="FIRE BUTTON":E#="■FIRE BUTTON■":OOT01
012
1008 IFP=39THENKEY=197:K1=60:K2=64:D#=" SPACE BAR ":E#="■ SPACE BAR ■":GOTO1012
1010 OOT01004
1012 PRINTTAB(11)"■■■SKILL LEVEL   1-5"
1014 PRINTTAB(11)"■C 1=HARD  5=EASY ]"
1020 P=PEEK(197)
1022 IFP=56THENSK=1:OOT01034
1024 IFP=59THENSK=.85:OOT01034
1026 IFP=47THENSK=.7:OOT01034
1028 IFP=11THENSK=.55:OOT01034
1030 IFP=16THENSK=.4:OOT01034
1032 OOT01020
1034 PRINTTAB(14)"■■■PLANE  SPEED"
1036 PRINTTAB(11)"■C F=FAST  S=SLOW ]"
1038 P=PEEK(197)
1040 IFP=21THENSP=9:RETURN
1042 IFP=13THENSP=4:RETURN
1044 OOT01038
1999 REM **** TITLE PAGE ****
2000 POKEVC+17,11:PRINT"■■■■■■■■■■  ■■■■  ■■■■■■■■■■  ■■■■  ■■■■  ■■■■
2002 PRINT"■■■■■ ■■■ ■■■ ■■■ ■■■ ■ ■ ■■■ ■■■ ■■■ ■■■■■ ■■■ "
2004 PRINT"■■■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■■■ ■■■ "
2006 PRINT"■■■■■ ■■■■■■■■■ ■■■ ■■■ ■■■ ■■■ ■■■■■■■■■ ■■■ "
2008 PRINT"■■■■■ ■■■■■■■■■ ■■■ ■■■ ■■■ ■■■ ■■■■■■■■■ ■■■ "
2010 PRINT"■■■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■■■ ■■■ "
2012 PRINT"■■■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■■■ ■■■ "
2014 PRINT"■■■■■ ■■■■■■■■■ ■■■■■■■■■ ■■■ ■■■■■■■■■ ■■■ ■■■■■ "
2016 PRINTTAB(12)"■■■■■ ■■■ ■■■ ■■■ ■■■ "
2018 PRINTTAB(12)"■ ■■■ ■■■ ■■■ ■■■ "
2020 PRINTTAB(12)"■ ■■■ ■■■ ■■■ ■■■ "
2022 PRINTTAB(12)"■ ■■■ ■■■ ■■■ ■■■ "
2024 PRINTTAB(12)"■ ■■■ ■■■ ■■■ ■■■ "
2026 PRINTTAB(12)"■ ■■■■■ ■■■ ■■■ "
2028 PRINTTAB(12)"■ ■■■■ ■■■ ■■■ ■■■■ "
2030 PRINTTAB(12)"■ ■■■■ ■■■■■ ■■■■■ ■■■■ "
2032 PRINTTAB(21)"■■■■■■BY■■■■■■LES ALLAN":POKEVC+17,27
2034 FORT=1TO1000:NEXT
2036 IFQ=1THENRETURN
2999 REM **** HI-RES CHARACTERS ****
3000 POKE56,48:POKE48,48
3002 POKE56334,PEEK(56334)AND254
3004 POKE1,PEEK(1)AND251
3006 FORI=0TO1024:POKE14336+I,PEEK(I+53248):NEXT
3008 POKE1,PEEK(1)OR4
3010 POKE56334,PEEK(56334)OR1
3012 FORI=0TO47:READR
3014 POKE15360+I,R:NEXT
3016 FORI=0TO383:READA:POKE12288+I,A:NEXT
3018 POKE2040,197:POKEVC+39,15
3020 POKE2041,192:POKEVC+40,CO
3022 POKE2042,194:POKEVC+41,12
3024 POKE2043,197:POKEVC+42,15
3999 REM **** INSTRUCTIONS ****
4000 POKEVC+17,11:POKEVC+24,23
4001 PRINT"■■■■■■■■■■
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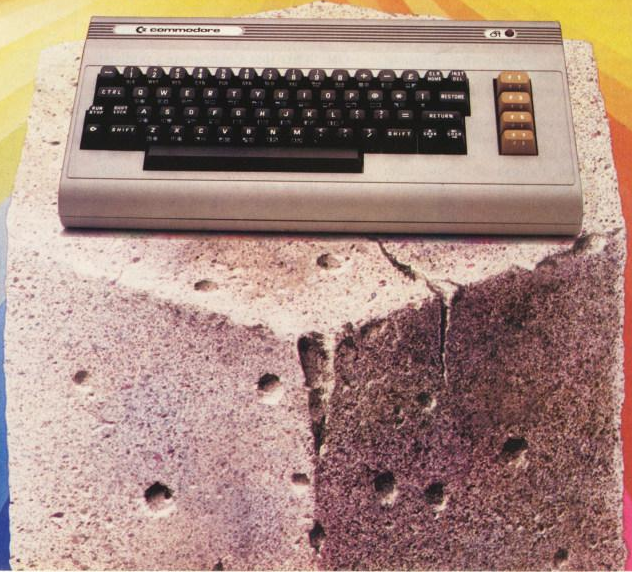


The department which has designs on you

***Graham Cunningham** talks to Gail Wellington — the lady leading Commodore's software charge*

"SOFTWARE SELLS hardware" is a common enough cry these days. But just six months ago Commodore president Jack Tramiel admitted: "In the past, our emphasis was on computer hardware." He put Sig Hartmann in charge of developing software in the US and added: "Today our philosophy has broadened." But the UK was already ahead of the States.

Twelve months earlier Gail Wellington had taken over as software products manager in Slough. As she says: "When I took over software was a small department, now there's 15 people here with more than 30 machines." And that department has designs on you.

In the run-up to Christmas Commodore is launching a range of packages covering games, business and education. Easy File, Fun Maths and Assembler Tutor will be out for the 64, backed up by the second part of Introduction to Basic, which has already sold well on the Vic. Other business packages include Easy Stock and Future Finance. Games addicts can indulge in Face Ache, Maggot Mania and Dancing Monster, while Ski, Trap and Space Snake, among others, are headed the way of Vic users.

None of this software is written in-house. As Gail says: "We'll look at anything anybody wants to send us." In fact Maggot Mania arrived through the post from 16-year-old Jason Perkins. Commodore suggested a few improvements, Jason incorporated the revisions and the finished version is now on sale. Programs can arrive other ways. For example, Gail first met graphic designer Paul Jay through the users' group ICPUG. Face Ache is a result of that meeting.

Assembler Tutor comes from Owen Murcott, an industrial training consultant, and Gail promises that this will be the one to ease the frustrations of Basic users perplexed by machine code. As she says: "A lot more people are becoming interested in machine code, partly to write better games and partly to understand more about the computer." Assembler Tutor aims to turn this interest into achievement, incorporating a question and answer format.

Sometimes two heads can be better than one when it comes to programming — and among Commodore's software authors those two heads tend to belong to fathers and their sons. Space Snake was written by John Colin, whose father is the man behind Introduction to Basic, while Future Finance comes from Finsama, a father and son team in Northern Ireland.

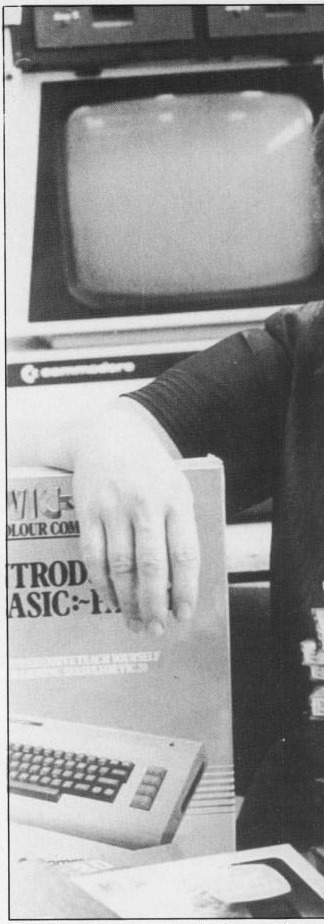
Finsama supports a philosophy close to Commodore's heart. Gail backs her president's aim of producing software for the masses — not for the classes. She explains that Finsama was "thrilled to death when we brought the cost of software down — because it would make it available to more people". Gail wants to produce software that will appeal to a broad range of users — it should all be easy and fun to use, even if it's for the education or business markets. However, in case Jack Tramiel's ability to turn a good quote should mislead, she adds: "Of course, we'll still produce specialist software for particular applications."

Driving force

Gail thinks that Commodore's president is "an amazing person". He is the driving force behind the firm with "tremendous instincts for the market". She adds: "We see him at least every two or three months." But you hear from him a lot more often. Jack Tramiel pursues a management policy of "kick 'em or kiss 'em". If he thinks you're doing well, you'll get the praise — equally "if you're not doing what he expects, you'll hear about it".

And what the president expects is more software. "We intend to be a major force in the software business," he said earlier this year, and Gail is backing him all the way. She supports his aggressive approach, thinking that "it's not an unreasonable way to run a business", and adds some touches of her own. On her desk sits a card bearing the tongue-in-cheek message: 'If at first you don't succeed, you're fired."

What this approach means for Commodore users is that a batch of new languages and adventures are on their way. More Scott Adams adventures will be available on the Vic, and some titles will be introduced on the 64. Users of both machines will also have a chance to play The Quest — a UK-produced lunch-time



Gail Wellington, Commodore's UK software products

favourite already at Commodore. If you've got a 64 the choice will be even wider. Another UK game, Medusa's Lair, is on its way along with some celebrated American titles from Infocom, including Suspended, Deadline and the Zork trilogy. Strategy fans can look forward to a series of simulations starting with High Flyer (not Heathrow this time, but a big-time business operator), Rail Boss and Ocean Racer — all for the 64.

As for languages, "the best implementation of Logo on any micro-computer" will be followed by a UK implementation of UCSD Pascal, Comal, Forth, Prolog, Pilot and a version of Cobol. As the list suggests Commodore has

manager — thinking in terms of "us in England and them over there"

its eye on the education market. Gail likes "selling things that have educational value" and thinks that the speech module due early next year for the 64 is "ideal for primary schools". A version for Vic users will follow later in the year, while talking books and programs are also on their way.

Users of the 64 have more to look forward to — gaining access to CP/M-based software. A Z80 card allowing this will "probably be available before Christmas" (the card is also needed to run the Cobol implementation). For 700 users the choice will be even wider: a CP/M-86 card has been finalised and MSDOS is being tested now. Specialised software on rival operating systems can then be used on Commodore micros, although Gail adds that "native operating system software will still run faster".

There are no plans for a second processor option on the Vic, and CP/M-86 and MSDOS will not be implemented on the 64 because its CPU is fundamentally different to the 700's. However, 64 users will be getting Commodore's software answer to Apple's Lisa. The price of Magic Desk has not been decided yet, but Gail says "it will be in the range of all our other software". And the most expensive package she sells for the 64 costs £75.

Like Lisa, Magic Desk provides pictures on the screen (called icons) identifying different items on the menu. So by selecting the typewriter icon you get word processing, the telephone gives you networking, the filing cabinet gives you the database, dustbin you can guess . . . and so on. As with most of Commodore's software the package is aimed at the "average consumer" although Gail thinks small businesses would also find Magic Desk worth considering. The icons have already been designed and the software to drive them "is in advanced stages of development".

Obviously things have changed since software was only a background activity at Commodore. Gail is pleased with the results so far and "particularly pleased that the UK is contributing so much". Ironically, though, the voice that declares "I'm proud to be a part of the UK's success" has an American accent — a fact that surprises a lot of people when she visits Commodore in the States. However, all but the accent has been assimilated. She now thinks in terms of "us in England and them over there" and takes "great delight in going back to America and representing the UK software authors".

Cringe

So how do you get Gail to represent you? The answer is to do as Jason Perkins did — send your tape or disk to Commodore in Slough. And don't worry about the quality of your coding, it's what your program achieves that's important. As Gail says: "We publish programs that would make teachers cringe — if the graphics are good, the quality of the coding doesn't matter." Commodore is sent more than 100 programs a month and accepts only about 5%. But every writer gets an evaluation sheet back with a detailed opinion of his submission. There's no need to send a printout, but don't forget to send instructions on how to use your program.

It is the successful 5% that are partly responsible for Commodore UK's software growth. The company operates worldwide ("I wouldn't like to pay our international phone bill," Gail comments) but the UK plays an important role in software development. In fact this month the UK is playing host to an international meeting of Commodore software managers to plan next year's strategy. The message is that "the UK is small but our software contribution is large".

Thus the US will take much of the software developed in the UK, although there are differences in taste. Cartridges, particularly of "shoot-'em-up" games, are preferred in the States. Gail adds that there's more interest in games of strategy over here, but in best diplomatic manner, she stays mum about the difference in national psyche this suggests.

"Shoot-'em-up" or strategy, Commodore is in the software business for real now — how far will it go? Rival micro manufacturer Atari is already transporting its games to run on Commodore machines, raising speculation that Commodore might do the same in reverse. "There's always a chance we'll do anything," Gail says, "but we've no immediate plans on this". As she adds: "My plate's full at the moment." ■

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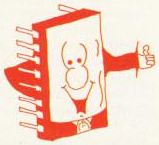

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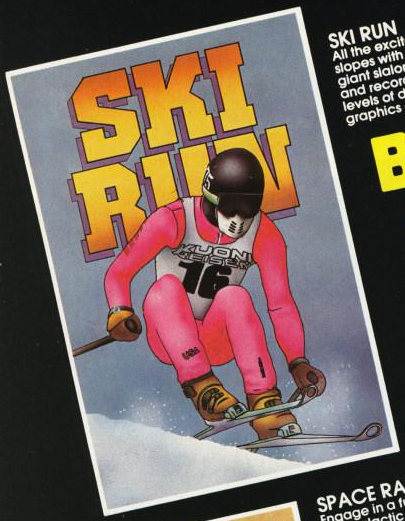

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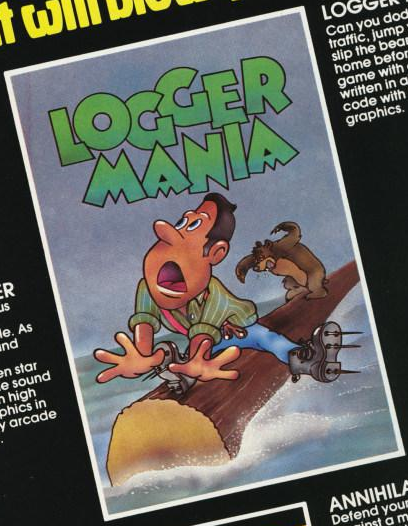

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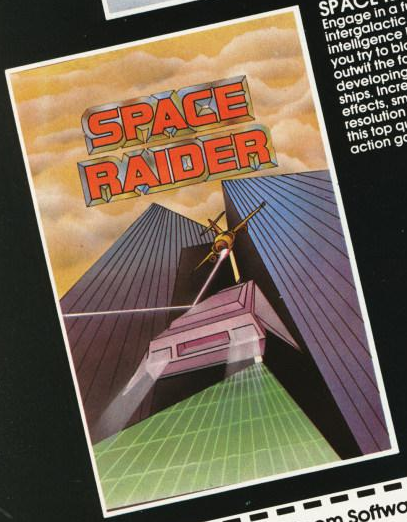

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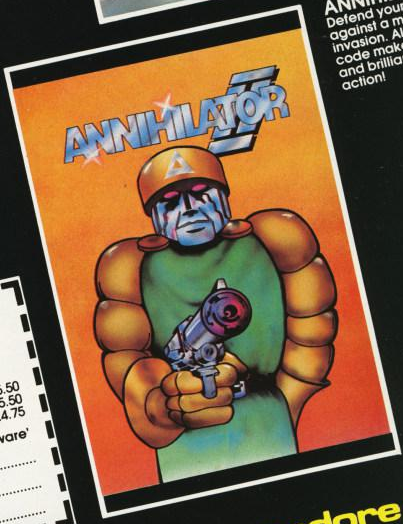

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SWARM ARCADE
by Andrew Haisley

You are a pilot testing the latest high speed star ship. Unfortunately however, you suffer a breakdown in all your guidance systems while in hyperspace, and materialize to discover you have entered the breeding grounds of the Psigophorus. This is an unbelievably nasty race of insect life forms who will stop at nothing to kill any other life form entering their space. Your only chance of survival is to destroy all the Psigophorus eggs before they can hatch to form a Swarm. Your ship is equipped with military defence systems and one powerful laser, capable of destroying the Psigophorus in certain parts of their life cycle, is still functioning. HOWEVER in certain stages the energy from your laser will actually speed up the breeding pattern. The Swarm is seeded by a fully mature Psigophorus, who will drop increasing numbers of eggs, depending on how many others you have destroyed. REMEMBER, selective shooting is far more effective than randomly shooting at anything that appears.

VIC 20 unexp
THUNDERFLASH ARCADE
by Andrew Haisley

Hampton Court in the year 2500 A.D. The Palace has been redesigned and rebuilt in outer space. Soon after it was opened somebody noticed that only half of the visitors emerged from it alive! Upon further investigation the Palace was found to be harbouring a gang of space Rats who were mugging any visitors that they caught and using their vital organs to build aerobic humanoids on which to perform experiments. In order to combat this, a single fighter from a nearby R. S. F. (Royal Space Fleet) base was detailed to go and destroy the Rats. The Rats however heard of this and designed some fiendishly clever automatic weapons and retired to a nearby black hole to watch the fun.

You are the R. S. F. Pilot. Can you beat the Rats at their own game?

VIC 20 unexp
ALIEN VORTEX ARCADE
by Andrew Haisley

Can you win at the ultimate form of gambling? It is the 23rd Century and, due to the tremendous advances made in robot technology, unemployment is running at 99.9%. To relieve the incredible boredom, the Intersteller Ruling Supreme Council has set up huge gambling arcades where fortunes can be won or lost and, due to 300% inflation money has been replaced by credit discs.

From time to time obviously people run up the odd debt, and as a way of providing an alternative to concrete ankle socks, the State Cultural Protectors devised "THE GAME" Inhabitants with no means of repaying their huge debts are allowed to "gamble" their lives. They are transported to Launch Base 3 and sealed into a Zelton III Earth Defender and attacked by waves of mutant birds, specially bred on the Space Station "Alien" by crossing Llamas with Pelicans. Unknown to the ill fated player, moneylenders who own the arcades then take bets on the length of the player's survival, so recovering their losses.

NOW prepare to be sealed into your assigned Zelton III Earth Defender and set your body modulator to HYPERDRIVE!

VIC 20 16K
DRAGON 32K
MICROPOLY
by Richard Fry &
Simon Lacey

The idea of the game is to buy, rent and sell properties so that the players increase their wealth. The wealthiest becoming the eventual winner.

Each player moves round the board in turn. If he or she lands on a property which is not already owned he or she may buy it. If the property has already been bought then the player who has landed on it pays the owner the rent.

If you are in debt then you will have to mortgage your properties until you are out of debt. If you land on Community Chest or Chance you will be given a card. These cards are of three main types: (1) Receive money (2) Pay out money, or (3) Move to a property.

When the board is shown you are represented as a number and your properties as a colour. When you have bought all the properties of one number group you may then buy houses. This increases the rent so you make more money.

The Computer acts as banker. It will also deduct and give you money when necessary, act as one of the players and throw the dice. It does not buy from or sell to other players.

VIC 20 Unexp
COBUS MAZ
by Dave Gibson

If the MINES don't get you then the COBUS will!

8 mind stretching mazes requiring concentrated effort to guide your man through. To take your lives are MINES and the deadly COBUS. At the beginning you are given five lives and five ZOGS. ZOGS are used to hyperspace a COBUS when you are cornered – but you only have a few seconds reprieve. Successful exit brings the reward of greater challenge with progressively difficult maze layouts and hidden complications, such as keys which require collecting in a correct order to open the door and DEVILISH INVISIBLE MINES . . .

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PROGRAMMING

*An extract from **Jim Hall's** forthcoming book "Business Applications on the 64"*

THE FIRST QUESTION you have to ask yourself is whether a computer system would be beneficial to your business. On completion of my accounts system, I continued with the manual version for some months as a comparison. The first, most obvious fact to emerge was the saving in time. My normal five days a month were reduced by the computer to half a day, with a great deal more information than I had time to compile by the long hand method. I had often heard people say "the computer is wrong again" so I was naturally wary of my results, tending to doubt the computer's if they differed to my "superior" long hand methods. After being proved wrong on every occasion, I have now come to the conclusion that computers are far more suited to producing accurate accounts, repeatedly.

Your own system?

The second question you have to ask is whether the time spent on designing and writing your own system is justified. If you require a system specific to your needs then the answer is Yes, otherwise you may have to change your routine to suit a commercially produced package. There are other advantages in writing your own system, such as understanding the programs in operation and being in a position to sort out problems which may be encountered. If you feel you cannot spare the time required then you could consider employing someone to do it for you. There are numerous amateur programmers around who would be more than willing to put their knowledge to an applied task. Be prepared, however, to spend some time with your programmer as it is unlikely that you will convey sufficient information to him/her the first time round.

What you'll need

Initially the purchase of a Commodore 64 and the Commodore cassette recorder for storing programs and information would be adequate for a large number of business applications and a printer and/or a disk drive could follow if required. Obviously certain programs, such as word processing, would need a printer or at least access to one, and there are firms who will undertake to print your script. Therefore, bearing in mind those who will purchase a 64 and cassette recorder initially, the programs listed here will produce the necessary information on the screen. But provision has been made for each program to be expanded to include printer and disk drive routines at a later date if required.

The introduction of a computer system is likely to enhance any business — consider that by entering into the computer each transaction, or a condensed coded version, once only, you will obtain a great deal of information at the end of the day, for example:

- Information to produce invoices and statements.
- A breakdown of customers' accounts.
- Complete information on all transactions to date, identifying VAT for instance, and also taking into account value of stock held, outstanding accounts and orders, and even your overdraft.
- Stock levels, updated in conjunction with customer accounts or direct sales and information on which items of stock should be re-ordered to bring the levels above a certain minimum.
- Analysis of stock movement over a specified period, facilitating planning and leading to a business being run more efficiently and economically.

In fact, any information you require is instantly available, bang up-to-date and in any format you could wish at the touch of a button.

A good impression

Consider the impression you would make on your bank manager if he rang one day, concerned about your overdraft, and you were able to present him with an up to the minute financial state of your business, confirmed by a typed report, posted that same day.

There are many books on computing, but they tend to stick to the raw facts with little imagination as to application in everyday business. With this in mind, my routines aim to produce working programs in such a way that lack of programming experience is not a serious disadvantage. The programs listed can be used as they are. I have attempted to write them in as plain and logical a manner as possible. This means that some steps are more long-winded than needs be, but from my own experience, I feel it is essential to produce working programs first and there is nothing to hinder you from modifying the programs at a later date as your knowledge increases. I would be disappointed if I thought this work did not stimulate the reader into modifying the listings to suit his/her own application — the only limitation is your own imagination.

Now down to some subroutines which will be of use in most business applications. (SPC) indicates upper case space or shift key/space and it is important that this is adhered to. The blanks or spaces appearing in the program should be included using the space bar key only. Subroutine 1 deals with allocating arrays, setting up strings, program security, disk error channel, and checking for printer presence. The first five lines, although obviously not part of the subroutine, explain the codes used in the program for control characters in place of graphic symbols. Graphic symbols can only be achieved by dot matrix or thermal printers and not typewriter printers. Note that neither the square brackets nor the code contained within should be included in a program, but the relevant control character inserted instead.

Setting the colours

In line 2 the two initial poke commands and chr$(144) set the screen and border colours to two shades of gray with black letters which gives reasonable contrast on a black and white TV set. Chr$(14) puts the computer into lower case mode (chr$(142) = upper case mode) and alternatives to these are poke53272,23 and poke53272,21 respectively. It is worth noting at this point the number 128, ie the difference between 14 and 142. This number added to or subtracted from character string codes will produce the opposite effect, ie chr$(29) cursor right and chr$(157) cursor left, the difference being 128. The last poke 255 enables all the keys to repeat with continuous pressure on a key.

In lines 3-6 the s6=1 variable is set to avoid the security routine (lines 14-26) when returning from the program second time round. Close 15, along with open 15,8,15 in line 6, engages the disk error channel but should be omitted in tape systems. The strings w1 and w2 in lines 4-5 will give a simple window/border effect when printed. This draws the eyes of the operator to a question and aids concentration. The addition of the program name is a constant reminder of the program running. By printing w2$ the screen is cleared of all information and is useful in programming.

Padding out strings

Lines 8-9 set up the variable bl$ with 60 shift/spaces and are used for padding out strings. Line 10 allocates space in memory for subscripted arrays, but the numbers can be altered to suit a particular program. Line 12 is needed if a compiler is being used. ▶

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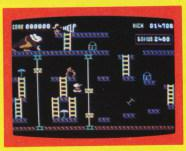
2. JUMP OVER THE PIES AS YOU RUN ALONG THE CONVEYOR BELT MAKE SURE YOU DONT END UP INSIDE THE COOKER.



3. THE ONLY WAY UP IS BY THE LIFT WHICH IS UNDER A CONSTANT BARRAGE OF GIRDERS.

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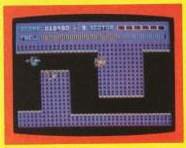

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```
1 rem ***sub 1.   1.8k    commodore 64.***
2 poke53280,11:poke53281,12:printchr$(144):printchr$(14):poke650,255:goto4
3 s6=1:close15:rem **close15 to be included using disc drive only**
4 wl$="[RVS]#####################################"
5 w2$="[CLS][RVS]Program Name.[SPC][SPC][SPC][SPC][SPC] [SPC][SPC][SPC][SPC]
    [SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC]
    [SPC][SPC][SPC][HOME][CD]"
6 open15,8,15:rem **to be included using disc drive only**
8 bl$="[SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC][SPC]
    [SPC][SPC][SPC][SPC][SPC]":rem ***20 upper case spaces***
9 bl$=bl$+bl$+bl$
10 dim$5(100),a6$(100),a7$(100),a8$(500),a9$(500)
12 rem ***add command to enable or disable run/stop key with compiler***
13 printw2$:ifs6=1then1000
14 print"[CD]  Copyright BELONGS to J. Doberman.[CD][CD]":printwl$
15 print"[CD]  Type in CODE to Proceed.[CD][CD]":printwl$:goto21
16 printw2$
17 print"[CD]You have either typed in the WRONG CODE[CD][CD][CD]"
18 print"                    OR
    [CD][CD][CD]"
19 print"     You are NOT an AUTHORISED User.[CD]"
20 printwl$:forj=1to3000:nextj:goto13
21 print"[CD][CD].....[CD]"
22 g$="":getg$:ifg$=""then22
23 ifg$=chr$(13)then25
24 co$=co$+g$:goto22
25 ifco$="dob"then27
26 co$="":goto16
27 printw2$:print"[CD][CD]Do you intend using the PRINTER?[CD][CD]":printwl$
28 gosub202:ify$="n"then1000
29 printw2$:print"[CD][CD]If a device not present message[CD]"
30 print"is returned then CONNECT the PRINTER    and RE-START Program.
    [CD][CD]"
31 open4,4:print#4:ifst=-128thenprint"[CD][CD]device not present":end
32 close4:goto1000
9999 close15:end:rem **close15 to be included using disc drive only**
```

Subroutine 1: allocates arrays, sets up strings, handles program security and checks for printer presence

◀With compiled programs, to enable or disable the run/stop key, specific commands are necessary and are detailed in the compiler manual.

Line 13-26 deal with program security and require a known code (co$ = DOB) to be entered before the program can be used.

Lines 22-24 are a routine for obtaining one character at a time from the keyboard, thus creating the variable co$, and they act as an alternative to the INPUT command. INPUT is a simple way of obtaining information, but offers no control over the characters typed in. If a comma or colon is part of the input, any information after these characters will be ignored. To prove the point try this simple program:

10 input"Type in Information";a$:print a$:goto10

Type in aaa,bbb or aaa:bbb and on pressing return, only the three as will be printed out and a message ? EXTRA IGNORED will appear on the screen. This means that a$ = aaa only and not aaa,bbb.

Using the same program press the space bar a few times followed by three Cs and press return. The result is a$ = ccc — the leading spaces have also been ignored. Type in b followed by a number of spaces and then c and a$ = b + blank spaces + c. By holding down the shift key and pressing the space bar a few times followed by b a$ will = blank spaces + b. The golden rule, therefore, for variables which require a space as the first character, is that the space must be a shifted space. This rule also applies to information obtained by the GET statement. Line 22 operates by searching the keyboard buffer to see whether a key has been pressed and, if not, loops back to the beginning of line 22.

In the tables on this page modes are:
(CD) = Cursor Down; (CU) = Cursor Up;
(CR) = Cursor Right; (CL) = Cursor Left;
(HOME) = Cursor to Home Position;
(CLS) = Clean Screen; (SPC) = Shifted Space; (RVS) = Reverse Field On;
(RVO) = Reverse Field Off

Obviously this security system, as it stands, is limited, as anyone with program experience could easily find the code by listing the program or typing in RUN 3 and by-passing the code input. One method of improving the system would be to make the code co$ invisible when the program was listed and this can be done quite simply by changing line 25 as follows:

25print"":ifco$=''dob''then27:print''26 deletes''

To include the 26 deletes type print'''' followed by moving the cursor back one place, hold down the shift key and press the inst/del key 26 times. Release shift key ▶

```
197 rem ######################################
198 rem ***sub 4.   1.1k    commodore 64***
199 rem ######################################
200 print"[CD][CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][CR]
    [RVS]###############"
201 print"[CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][RVS]#
    [RVO]Are you SURE[RVS]#"
202 print"[CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][RVS]#############
    ########"
203 print"[CR][CR][CR][CR][CR][CR][CR][CR][CR][CR][RVS]#[RVO]y for
     yes  n for no[RVS]#"
204 print"[CR][CR][CR][CR][CR][CR][CR][CR][CP][CR][RVS]#############
    ########"
205 y$="":gety$:ify$<>"y"andy$<>"n"then205
206 printw2$:return
207 printwl$
208 print"[CD]**ERROR**  WRONG INPUT   Try Again."
209 printwl$:print"[CD][CD]":return
210 print"[CD][CR][CR][RVS]####################################"
211 print"[CR][CR][RVS]#[RVO]****SPACE BAR Key to Continue****
    [RVS]#[RVO]"
212 print"[CR][CR][RVS]####################################"
213 g$="":getg$:ifg$=""then213
214 g=asc(g$):ifg=32org=160thenprintw2$:return
215 goto213
216 printw2$:print"[CD][CD][CD][CR][CR][CR][CR][CR][CR][CR]Do you
    wish to Proceed?[CD][CD][CD]"
217 printwl$:gosub202:printw2$:return
218 printw2$
219 print"[CD][CD][CD]FINISHED adding Data to File.   Do"
220 print"[CD]you require the File to be CLOSED?[CD][CD]":gosub200:print
    w2$:return
221 printw2$:print"[CD][CD]Return to MENU Program?[CD][CD]":printwl$
222 gosub202:ify$="n"thenrun3
223 printw2$:print"[CD][CD]Place MENU Tape in the Recorder.[CD][CD]":
    printwl$:gosub210
224 close15:clr:print"[CLS]load"+chr$(34)+"menu"+chr$(34):rem**close15
    disc only**
225 print"[CD][CD][CD][CD]run":poke198,3:poke631,19:poke632,13:poke633
    ,13:end
226 printw2$
227 print"[CD][CD][CD][CR][CR][CR][CR][CR][CR]Do you Require ANOTHER
    Copy?[CD][CD][CD]"
228 printwl$:gosub202:printw2$:return
```

Subroutine 2: deals with some of the most common questions encountered when writing business programs

◀ and press inst/del key 26 times. On listing the program, line 25 now reads print"" only, in other words the important code word (dob) has disappeared.

Plugged in

Lines 27-32 make up a routine which, basically, is asking whether a printer will be used in the program operation and if it is, will check whether the printer is plugged in or not. Various results are obtained and it is a matter of experimentation to establish the correct routine to suit. Factors affecting the routine are whether the printer is plugged directly into a computer or plugged into the back of the disk drive. In line 31 command open4,4 refers to open a channel or line 4 to device number 4. Device number 4 is the code which the computer recognises as a "printer has to be accessed". ST or status byte provides a record of the status of the system after a peripheral such as a tape recorder or printer has been accessed. If all systems are correct the variable ST is returned as zero. The -128 is the code for DEVICE NOT PRESENT and although a return of this error number should be intercepted, it can happen that the running program will stop and will have to be re-started from scratch. There is obviously little point in running a program dealing with complicated data analysis only to have the program end because the printer has not been plugged in. Far better to establish this point at the very beginning.

Line 9999 will end the program and close the disk error channel. CLOSE 15 will close all other disk channels and should be omitted in a tape system.

Subroutine 2 is a simple routine dealing with common questions which are frequently referred to and can save valuable memory space and programming time. Lines 200-206 can be accessed either at line 200 or 202 depending on the type of question to be asked, eg the operator has been requested to enter a data file name and gosub200 ensures that the operator checks the entry before continuing. Gosub202 would be referred to for a straight YES or NO answer to a question such as DO YOU WISH TO PROCEED? gosub202. Line 205 will not accept keyboard entries unless they are either y or n. Line 206 clears the screen, places the program name at the top and returns to the point after access.

Program pause

Lines 210-215 provide a halt in the running program to enable the operator to place a tape in the recorder or paper in the printer. Line 214 will only accept a SPACE BAR entry to continue. Numerous programs request PRESS ANY KEY to continue and this is not advisable. A colleague of mine included this statement routinely in his program until one day, during a demonstration of a program to a captive audience, the RUN/STOP key was entered and caused him some embarrassment. It is, therefore, advisable to always specify a key entry. The space bar is ideal in that it is at the bottom of the keyboard, is large and easily found by the operator. This is an example of making a program interactive with the operator just as good screen display is important too.

Lines 221-225 deal with the automatic loading and running of a MENU program by enquiring whether this is intended and if the answer is NO the command RUN3 is operated. Use of RUN in programs will probably be frowned upon by many programmers who will decree "sloppy programming technique". They are, of course, correct, but it's use is also very convenient in that all variables and arrays are cleared from memory and the program is restarted as if it had just been loaded. By stipulating RUN3, the variable s6 is set to one and the code entry sequence is by-passed.

Lines 223-225 deal with the mechanics of loading and running the menu program. CLR clears all variables from memory, the screen is cleared and load "menu" is printed on the screen followed by a four line gap and run is printed onto the screen. Note the sequence to print quotation marks at menu, ie the use of chr$(34). The positive sign can be used instead of a semicolon to allow the line to be printed to the screen in sequence.

The effect created by the pokes in line 255 is identical to typing load "menu" on the screen, pressing the return key, followed by run and return key as in direct mode. It is possible to use the load command in the program mode, ie 3000 load "menu". However, problems can arise from this method if the program to be loaded is in fact longer than the original program. ■

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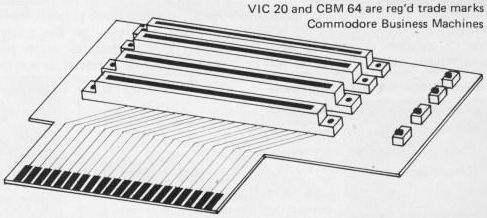

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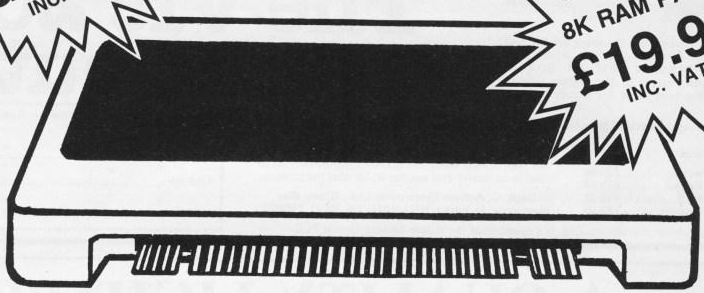

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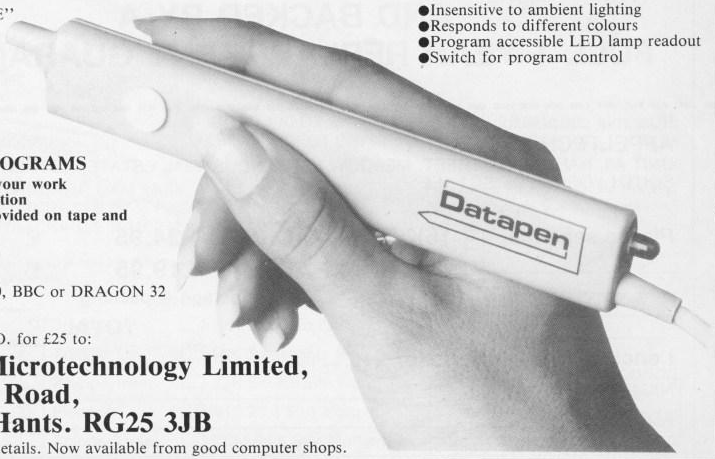

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COMMODORE SOFTWARE FILE

Moles

From Martyn Fredrickson in Norwich — for the unexpanded Vic

IN THIS GAME, your job is to drop weights on moles who dare to pop their heads out of their molehills.

You can drop up to 15 weights, but you have a time limit of two minutes in which to drop them. To drop them, use the F7 function key.

There are three molehills, and the moles are constantly on the move, so even if you drop the weight down the hole, you could still miss. If you hit the mole, it is splattered, and the sound of a squelch is emitted. You will score 10 points for each you hit, meaning a maximum of 150 points. If you miss, however, a short buzz sounds, turf flies, and you score nothing.

When you run out of bombs, a short message appears, and the program reruns itself. If you run out of time, the timer buzzes, and you restart.

```
3 SC=0
5 CC=30720:X=0:S4=36877:S1=36874:DB=0:S3=36876:S=234
8 POKE36878,15
10 REM*****************
11 REM*                *
12 REM*     MOLES.     *
13 REM*                *
14 REM*       BY       *
15 REM*                *
16 REM*     MARTYN     *
17 REM*                *
18 REM* FREDERICKSON *
19 REM*                *
20 REM*    (C) 1983    *
21 REM*                *
22 REM*****************
23 REM***TITLES***
26 POKE36879,187:PRINT"■"
28 PRINT"■■■ ▚▀▀ ▚▀▀ ▚▀▀ ▀▀▚ ▚ ▚   ▚   ▚ ▚▀▚ ▀▀▚"
30 PRINT"■ ■   ▚ ▚ ▚ ▚ ▚ ▚   ▚ ▚   ▚ ▚ ▚ ▚"
40 PRINT"■ ■   ▚ ▚ ▚ ▚ ▚ ▚   ▚ ▚   ▚ ▚▀▚ ▀▀▚"
50 PRINT"■ ■ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚   ▚ ▚ ▚ ▚ ▚"
60 PRINT"■ ■ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚   ▚ ▚ ▚ ▚▄▀"
70 PRINT"■■■   ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚"
80 PRINT"          ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚"
90 PRINT"          ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚"
100 PRINT"         ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚"
110 PRINT"         ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚ ▚▀▚"
115 PRINT"■"
120 PRINT"■   DROP 15 WEIGHTS &"
130 PRINT"■   SQUASH THE MOLES."
140 PRINT"■■    KEY G TO PLAY."
150 GETG$:IFG$<>"G"THEN150
160 POKE36879,255:PRINT"■";
170 PRINT"■■■
```

```
410 ONMHGOTO420,440,460
420 POKE8169,65:POKE8169+CC,0:X=8169
425 FORT=1TO35:NEXTT
427 IFF=1GOTO500
430 GOTO190
440 POKE8175,65:POKE8175+CC,0:X=8175
445 FORT=1TO35:NEXTT
447 IFF=1GOTO500
450 GOTO190
460 POKE8181,65:POKE8181+CC,0:X=8181
465 FORT=1TO35:NEXTT
467 IFF=1GOTO500
470 GOTO190
500 REM***DROP BOMB***
504 IFDB=15THENPRINT"■■■■■     NO MORE BOMBS!":FORT=1TO5000:NEXTT:RUN
505 IFPEEK(B+22)=65GOTO600
510 IFPEEK(B+22)<>32GOTO700
515 IFB+22>8164GOTO700
520 POKEB,32
530 B=B+22:POKEB,81:POKEB+CC,4
532 IFS=200THENS=234:GOTO190
533 POKES3,S-1:FORT=1TO25:NEXTT:S=S-1
540 GOTO390
600 REM***SPLAT MOLE***
601 POKES3,0
610 POKEB,32:POKEX,42:POKEX+CC,2
620 FORS=1TO100:POKES4,155:NEXTS:POKES4,0
623 POKEX,121:POKEX+CC,0
624 S=234
625 SC=SC+10
630 PRINT"■■■          SCORE=";SC
640 DB=DB+1:GOTO175
700 REM***EXPLODE BOMB***
701 POKES3,0
710 POKEB,32:R=PEEK(B+22):U=PEEK(B+21):V=PEEK(B+23)
712 POKEB-2,46:POKEB,46:POKEB+2,46:POKEB-2+CC,5:POKEB+CC,5:POKEB+2+CC,5
715 POKEB+22,66:POKEB+21,77:POKEB+23,78:POKEB+22+CC,5:POKEB+21+CC,5:POKEB+23+CC
,5
720 FORS=1TO50:POKES1,175:NEXTS:POKES1,0
723 S=234
725 POKEB-2,32:POKEB,32:POKEB+2,32
727 POKEB+22,32:POKEB+21,32:POKEB+23,32
730 POKEB+22,R:POKEB+22+CC,0
732 POKEB+21,U:POKEB+21+CC,0
734 POKEB+23,V:POKEB+23+CC,0
740 DB=DB+1:GOTO175
```

Apple Fall

A 64 game from Gary Turner and Andrew Wilson in Macclesfield

A MONUMENTAL structure has been erected in Newton's honour, but it is doomed to be bombarded by apples falling from the sky. Consequently, in order to save the masterpiece from sure destruction, a robot has been assigned to the job of catching the falling apples, thus preventing the structure from damage.

However, the robot must be quick enough to negotiate ladders and vault over gaps in order to catch the falling apple before it hits a platform. To help him in this task a transporter beam has been installed on both sides of the structure making his job easier and movement across the screen quicker.

Beware — should the robot touch the sides of the screen or fall from the scaffolding his existence will be terminated, and it is possible he may become trapped in gaps created by the falling apples. Also, once he has collected 10 apples (or less) he must deposit them in collecting baskets while the apples are still falling — so be quick.

The game is played using the joystick in port two, and to make the robot jump, the fire button must be pressed in co-ordination with joystick movement. A comprehensive set of instructions is contained within the program which incorporates sound and user defined graphics, as well as the ability to change the difficulty of the game by altering the "ZZ = 1 to ?" variable in line 30 (1 to increase difficulty, 4 to make it easier —depending upon the player's proficiency).

It can be a frustrating game at the best of times so good luck — your're going to need it!

Program notes

10 GOTO line 700
20 Generates apple. Check number of apples collected
30-145 Move man. Check to see if man has hit anything
150-180 Move apple and update score
190 Sound produced when apple hits frame
200-210 Replacing character behind robot
240-260 Robot jumps left
270-290 Robot jumps right
300-310 Routine when man deposits apples
400-460 Operation of transport beam
470-490 End of game if 5 apples hit base of screen
500-590 End of game routine: explosion: score: another go (Y/N)
700-1140 Instructions
1500-1650 Define characters
1700-1930 Print structure on screen
1940 Set up variables
1990 Return game to line 20

The variables are as follows:

M — Position of Robot
G — Apple
AP — Number of apples collected
LI — Number of apples having reached base of screen
SC — Overall score
A — Character to be placed behind robot
B — Colour to be placed behind robot
JV — Joystick value
FR — Fire button value

```
 10 GOSUB700
 20 G=INT(1028+31*RND(0)):PRINT"■                    ":IFAP>10THENAP=10:IFLI>4THEN470
 30 FORZZ=1TO2:POKEM,6:POKEM+CO,7:JV=PEEK(56320):FR=JVAND16:JV=15-(JVAND15)
 35 POKE54296,15:POKE54277,190:POKE54276,17:POKE54278,190
 40 IFJV<>0THENPOKEM,A:POKEM+CO,B:POKE54273,20:IFA=7ORA=8THENPOKEM,32
 50 IFJV=4ANDFR=16THENM=M-1:IFPEEK(M)=0ORPEEK(M)=1THENM=M+1
 60 IFJV=8ANDFR=16THENM=M+1:IFPEEK(M)=0ORPEEK(M)=1THENM=M-1
 70 IFJV=1ANDPEEK(M)=2THENM=M-40
 80 IFJV=2ANDPEEK(M+40)=2THENM=M+40
 90 IFJV<>0THENA=PEEK(M):B=0:IFA<>32THENB=PEEK(M+CO)
100 IFJV=4ANDFR<>16THENGOSUB240
110 IFJV=8ANDFR<>16THENGOSUB270
120 IFPEEK(M+40)=32THENPOKEM,32:M=M+40:POKEM,6:POKEM+CO,7:GOTO120
130 IFA=5THENGOSUB300
135 IFM=1665ORM=1662THENGOSUB400
140 IFPEEK(M+40)=8ORA=8THEN500
145 POKE54273,0:NEXTZZ
150 POKEG,32:G=G+40:IFPEEK(G)=6THENAP=AP+1:POKE54273,40:A=32:POKEM,32:GOTO20
160 IFPEEK(G)<>32THENPOKEG,32:POKEG+40,32:GOSUB190:GOTO20
170 IFG>1943THENLI=LI+1:GOTO20
180 POKEG,7:POKEG+CO,10:PRINT"■"SC;" : ";AP;"  ":GOTO30
190 POKE54296,15:POKE54277,190:POKE54276,33:POKE54278,190:POKE54273,10:RETURN
200 A=PEEK(M):B=0:IFA=32THENRETURN
210 B=PEEK(M+CO):RETURN
240 IFPEEK(M-41)=0ORPEEK(M-41)=1THENRETURN
245 POKEM,A:POKEM+CO,B:M=M-41:GOSUB200:POKEM,6:POKEM+CO,7
250 IFPEEK(M+39)=0ORPEEK(M+39)=1THENRETURN
260 POKEM,A:POKEM+CO,B:M=M+39:GOSUB200:POKEM,6:POKEM+CO,7:RETURN
270 IFPEEK(M-39)=0ORPEEK(M-39)=1THENRETURN
275 POKEM,A:POKEM+CO,B:M=M-39:GOSUB200:POKEM,6:POKEM+CO,7
280 IFPEEK(M+41)=0ORPEEK(M+41)=1THENRETURN
290 POKEM,A:POKEM+CO,B:M=M+41:GOSUB200:POKEM,6:POKEM+CO,7:RETURN
300 IFAP<1THENRETURN
310 POKE53280,10:FORI=1TOAP:AP=AP-1:SC=SC+1:NEXT:POKE53280,11:RETURN
400 IFM=1665THENM=1661:POKE1665,8:POKE1665+CO,8
410 IFM=1662THENM=1666:POKE1662,8:POKE1662+CO,8
420 POKE54277,190:POKE54276,33:POKE54278,190
430 FORZ=0TO40STEP.5:POKE54273,Z:NEXTZ
440 POKE54277,0:POKE54276,0:POKE54278,0:POKE54273,0
450 A=2:B=0:RETURN
470 PRINT"■":POKE53280,0:POKE53281,0:POKE53272,21
480 PRINT"■■■■■■■■■■          5 APPLES HAVE REACHED THE"
490 PRINT"■              BOTTOM OF THE SCREEN"
495 FORI=1TO1000:NEXTI
500 POKE54277,190:POKE54276,129:POKE54278,190:POKE54273,6
510 FORX=15TO0STEP-.3:FORZ=1TO20:NEXTZ:POKE54296,X:NEXTX
520 POKE54277,0:POKE54276,0:POKE54278,0:POKE54273,0
530 PRINT"■":POKE53280,0:POKE53281,0:POKE53272,21
540 PRINT"■■■■■■          YOU SAVED■";SC;"■APPLES"
550 PRINT"■■■■■■■■■■
```

```
810 PRINT"SIDE OF THE SCREEN. HOWEVER,SHOULD ANY"
820 PRINT"APPLES ESCAPE YOUR 'A.A.C.' AND HIT THE"
830 PRINT"SCAFFOLDING THEY WILL CAUSE EXTENSIVE"
840 PRINT"DAMAGE MAKING YOUR TASK EVEN HARDER."
845 PRINT"■■■        ■HIT A KEY TO CONTINUE"
846 IFPEEK(197)=64THEN846
850 PRINT"■■■  SHOULD THE SCAFFOLDING BE DAMAGED IN"
860 PRINT"SUCH A WAY THAT IT IS IMPOSSIBLE TO MOVE"
870 PRINT"■FROM ONE SIDE TO THE OTHER ACROSS THE"
880 PRINT"STRUCTURE,YOU WILL BE FORCED TO USE"
890 PRINT"THE TRANSPORTER BEAM (■ ■) WHICH WILL"
900 PRINT"MAKE YOU APPEAR AT THE TWIN BEAM ON THE"
910 PRINT"OTHER SIDE OF THE STRUCTURE.YOU MAY MOVE"
920 PRINT"■TO EITHER SIDE USING THIS METHOD."
940 PRINT"■■   ■THE ANTI THEFT DEVICE SURROUNDING THE"
950 PRINT"SCAFFOLDING (■BLUE■) IS LETHAL TO YOUR"
960 PRINT"ROBOT SO IF HE FALLS THROUGH THE"
970 PRINT"SCAFFOLDING ONTO THE FLOOR,OR STRAYS TOO"
980 PRINT"■FAR WHEN DEPOSITING HIS APPLES - ■ZAP!!"
985 PRINT"■■■WARNING:■IF ■5■ APPLES HIT THE FLOOR THEN"
986 PRINT"■                ■ZAP!!!"
990 PRINT"■■          ■HIT A KEY TO CONTINUE"
1000 IFPEEK(197)=64THEN1000
1010 PRINT"■■■  THE SCORE IS DISPLAYED IN THE TOP LEFT"
1020 PRINT"■HAND CORNER OF THE SCREEN ALONG WITH"
1030 PRINT"THE NUMBER OF APPLES YOUR ROBOT IS"
1040 PRINT"CARRYING-(SCORE:LOAD);YOUR FINAL SCORE"
1050 PRINT"IS THE NUMBER OF APPLES DEPOSITED IN"
1060 PRINT"THE COLLECTING BASKETS DURING THE GAME."
1070 PRINT"■■                ■MOVEMENT"
1080 PRINT"■   USE JOYSTICK IN PORT 2 TO MOVE:-"
1090 PRINT"          UP:DOWN:LEFT:RIGHT."
1100 PRINT"■   ■THE FIRE BUTTON ENABLES THE ROBOT TO"
1110 PRINT"JUMP A ONE SPACE GAP IN WHICHEVER"
1120 PRINT"DIRECTION IT MAY BE TRAVELLING;PROVIDING"
1130 PRINT"■THERE IS SUFFICIENT HEADROOM."
1140 PRINT"■■              ■GOOD LUCK!!"
1500 POKE56334,PEEK(56334)AND254:POKE1,PEEK(1)AND251
1510 FORI=0TO511:POKEI+12288,PEEK(I+53248):NEXT
1520 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334)OR1
1530 FORCHAR=0TO8
1540 FORBYTE=0TO7:READN:POKE12288+(8*CHAR)+BYTE,N:NEXTBYTE:NEXTCHAR
1550 DATA255,255,255,255,255,255,255,255
1560 DATA129,66,36,24,24,36,66,255
1570 DATA255,129,129,129,129,129,129,129
1580 DATA192,192,192,192,192,192,192,192
1590 DATA3,3,3,3,3,3,3,3
1600 DATA255,255,66,102,36,60,24,24
1610 DATA129,129,66,231,153,153,102,66
1620 DATA0,36,126,126,126,126,60,0
1630 DATA255,255,255,255,255,255,255,255
1640 PRINT"■■■    HIT A KEY TO PLAY THIS ACE GAME"
1650 IFPEEK(197)=64THEN1650
1700 POKE53272,29:PRINT"■":POKE53280,11:POKE53281,11:PRINT"■■■■":CO=54272
1710 PRINT" ■E                                          E"
1720 PRINT" ■■■B                                        ■B■■"
1730 PRINT" ■■■B                                        ■B■■"
1740 PRINT"  ■B                                        ■B"
1750 PRINT"  ■B                                        ■B"
1760 PRINT"  ■B                                        ■B"
1770 PRINT"  ■B                                        ■B"
1780 PRINT"  ■B                                        ■B"
1790 PRINT"  ■B      B■■■■ ■■■■■ ■■■B           ■■■■B B"
1800 PRINT"  ■B      B■■■■ ■■■■■ ■■■B      B■■■■B ■■■■B B"
1810 PRINT"  ■B      B      ■■D       ■B■■■■■■■ ■B■■■B    B B"
1820 PRINT"  ■B      B      ■■D       ■B■■■■■■■ ■B   B    B B■H"
1830 PRINT" ■H■B     B B■■■ ■■■B■■■  ■B       B  B■■■ ■B■■■■"
1840 PRINT" ■■■■B ■■■■B■■■ ■B■■■ ■■■B■■■■ ■■■■■B ■■■■■  ■B■■■ ■B■■■■"
1850 PRINT" ■■■■B ■■■■B■■■ ■B ■■C    ■B    ■■■■B ■■■■■  ■B    B"
1860 PRINT"    ■B    B  B ■■C    ■B       B ■■C      ■B    B"
```

```
1870 PRINT"    ■B    B  B ■■■■■■■■■    ■B ■■C      ■B    B"
1880 PRINT"    ■■■■■■■■■ ■■AAAAAAAA    ■■■■■■■ ■■■■■■"
1890 PRINT"    ■■AAAAAAAA ■■C          ■■D    ■■AAAAAA AAAAAA"
1900 PRINT"    ■■C          D C        D    C     D C     D"
1910 FORI=1024TO1944STEP40:POKEI,8:POKEI+CO,6:NEXT
1920 FORI=1063TO1983STEP40:POKEI,8:POKEI+CO,6:NEXT
1930 FORI=1984TO2023:POKEI,8:POKEI+CO,6:NEXT
1940 A=32:AP=0:SC=0:M=1828:LI=0
1990 RETURN
```

Light Sound

From Richard Barton in Dagenham — for the Vic 20 with Super Expander

THIS PROGRAM generates music in four parts and full colour graphics in grids, circles, triangles, etc. The choice of graphic shape is dependent upon the musical notes chosen and they are overlaid one upon the other in different colours.

The program is for the Vic 20 plus Super Expander.

```
10 REM LIGHT & SOUND
12 REM R.BARTON.1983
14 GRAPHIC2
20 S1=36874:S2=36875:S3=36876:
   S4=36877:V=36878
30 POKEV,5
50 FORRP=1TO8
60 CO=INT(RND(1)*15)
70 COLORCO/2,0,CO,0
80 A=INT(RND(1)*127)+50
90 B=INT(RND(1)*127)+125
100 C=INT(RND(1)*127)+125
110 D=INT(RND(1)*127)+125
120 TD=INT(RND(1)*900)+1
130 E=INT(RND(1)*1020)
140 F=INT(RND(1)*1020)
150 G=INT(RND(1)*1020)
160 H=INT(RND(1)*1020)
170 POKES3,A
180 DRAW2,E,FTOG,HTO500,1023TOE,F
190 FORT=1TOTD:NEXTT
200 POKES2,B
210 POKES1,C
220 FORT=1TO(TD/5):NEXTT
230 IFTD<50THENPOKES4,D
240 IFCO=1THEN:CIRCLE2,E,F,G,H
250 IFCO=8THENGOSUB330
260 IFA<130THENGOSUB370
270 IFTD>890THENGOSUB410
280 IFTD<10THENGOSUB460
290 FORT=1TO(TD/2):NEXTT
300 POKES4,0:NEXTRP
310 SCNCLR
320 GOTO50
330 FORGR=10TO1020STEP50
340 DRAW2,0,GRTO1023,GR
350 NEXTGR
360 RETURN
370 FORGR=10TO1020STEP50
380 DRAW2,GR,0TOGR,1023
390 NEXTGR
400 RETURN
410 FORCR=10TO500STEP50
420 CIRCLEOVER2,500,500,CR,CR
430 NEXTCR
440 POKES1,0:POKES2,0:POKES3,0:POKES4,0
450 RETURN
460 RG=INT(RND(1)*1000)
470 IFRG<500THEN:FORGR=RGTO500STEP20
480 IFRG>500THEN:FORGR=RGTO500STEP-20
490 DRAWOVER2,500,500TORG,GR
500 NEXTGR
510 RETURN
```

Creating 3D graphics

For the Super Expanded Vic — from Marc Sinclair, London SW2

ALTHOUGH SMALL this program creates a 3D pattern on the Vic 20 high resolution screen.

```
MARC SINCLAIR

0 GRAPHIC2:COLOR6,6,1,1:FORA=0TO420STEP1
0:B=SIN(A/50)*100:CIRCLE2,512,B+500,A,
A:NEXT
1 END
```

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First steps on the road to robot building

The first few stages in constructing turtles and micromice may be inexpensive but not without the occasional stumbling block, as ***Dr John Billingsley*** *explains*

STEPPER MOTORS are a favourite actuator for obtaining motor output. Their drives involve only logic signals, with no need for digital-to-analogue conversion. Until recently only precision "upper-class" motors were available at an outrageous price, but with the microcomputer and a requirement for low-cost peripherals there has come a demand for cheap stepper motors which the industry has been swift to fulfil. A suitable motor for turtles and micromice is the Philips ID35, distributed by Impex of Richmond at around £12.00.

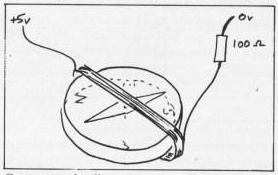
Despite their apparent advantages, stepper motors are not without their problems. They have a firm restriction on their top speed, and the useful torque falls off dramatically as this is approached. Sudden speed changes, even at relatively low speeds, can stall the motor. Unfortunately, unless special sensors are added, the computer is unaware that the motor has slipped "out of cog". All subsequent movements therefore take place with a position error, until a reset manoeuvre is made. Another drawback in a battery-driven system is power consumption: even when stationary a stepper draws as much power as under full load.

Down to work

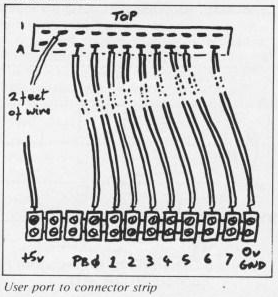
Just how does a stepper motor work? The rotor is a permanent magnet, while the stator (the fixed case) has a number of electrical windings which when energised create a magnetic field. The field pulls the rotor into line, and by changing the selection of energised windings in a suitable sequence, the rotor is pulled round step by step. When the stepping stops, the rotor is held in position by the magnetic field.

The movement of the permanent-magnet rotor can be likened to the rotation of a magnetic compass — indeed you can use a compass in an experiment to demonstrate how a stepper motor operates. Obtain a cheap compass — the simple sort with a pointer rather than an ornate card will be best. Wind a coil of 50 turns of fine enamelled copper wire — 36 swg or finer — across the compass — obviously the wire must not obscure the view of the needle. Connect a 47 ohm resistor in series with the coil, and apply 5v across the ends. You will find experimenting much easier if you connect the user port to a "chocolate-block" terminal strip, as shown in Figure 2. You can now find 5v and ground on the connector strip.

When the voltage is applied, the needle should rotate and line up almost perpendicular to the coil, ie along the axis of the coil. Reverse the applied voltage, and the needle will reverse. Could the coil, and hence the needle, be driven directly from two bits of the user port? Unfortunately the current available from PBO-7 is limited to about three milliamps, and unless you are prepared to wind coils of several hundred turns this will not dominate the effect on the needle of the earth's magnetic field. We must therefore use some amplification — no bad thing in preparing to drive genuine stepper motors. The simplest amplifier consists of just one resistor and one transistor per bit of output — four of each per motor. (Later on we can consider using a Darlington driver chip instead.) A good general purpose PNP transistor is a 2N 3703 (RS 294-334), costing well under £1.00 per pack of five.



Compass and coil



User port to connector strip

First connect just one transistor to your coil, driving it from PBO via a 1 kohm resistor as shown in Figure 3. Connect the circuit and switch on. Nothing should happen to the compass at first. Set the output data register to all-bits-high by typing POKE 56577,255. Then configure bits 0-3 as outputs by typing POKE 56579,15. Still nothing should happen, because the output of PBO is high, and does not yet sink any current via the transistor base. Now type POKE 56577,255-1. This will take PBO to zero and current will flow into PBO from +5v through the transistor base and R1. The transistor will be turned on, applying 5v from the transistor collector to the coil and resistor. The needle should leap into action. Turn the current off again with POKE 56577,255 before the resistor R2 starts cooking.

To reverse the needle, we must be able to pass current in the opposite direction. With a circuit as simple as this one, we cannot reverse the current in the wire, and so we need a second coil, would directly over the top of the first. Wind a further 50 turns of wire, connecting one end to the resistor, and winding in a direction such that the two joined wires become the half-way point of the coil which now has 100 turns. Connect a twin of the transistor circuit, and drive it from PBI, as in Figure 4.

Mercy

Now the commands POKE 56577,255-2 followed by POKE 56577,255-1 should drive the compass needle first one way (north, say) and then the other (south). Another command POKE 56577,255, will switch off both arms of the coil, and the compass will be left to the mercy of the earth's field.

So far messing about with a compass does not seem to have much to do with motors. But now the plot gets more exciting. Wind another twin coil, also of 50 + 50 turns, over and perpendicular to the first coil. Now when the new coil is connected via two more transistors and driven from PB2 to PB3, the command POKE 56577,255-4 will cause the needle to point in the new direction. If the first coil caused the needle to point north or south, then the second coil causes the needle to point east or west. By switching on one of the N-S coils and one of the E-W coils together we can also obtain NE, SE, SW and NW (see Figure 5).

Speed and acceleration control

Enter and run the following program:

```
10 POKE 56579,15    : REM PB0-PB3 ARE OUTPUTS
20 POKE 56577,255-5 : REM BOTH COILS ON TO GIVE N-E
30 GOSUB 200        : REM 1 SECOND DELAY
40 POKE 56577,255-9 : REM NOW COILS GIVE N-W
50 GOSUB 200
60 POKE 56577,255-10 : REM NOW COILS GIVE S-W
70 GOSUB 200
80 POKE 56577,255-6 : REM S-E
90 GOSUB 200
100 GOTO 20         : ROUND AGAIN FOR ANOTHER REVOLUTION
200 FOR I=1 TO 1000: NEXT:RETURN : REM DELAY 1 SECOND OR SO
```

The compass needle should now rotate, if somewhat jerkily, acting as a stepper motor.

Now you can try a variety of numbers in line 200 to set the speed of the motor. You will find that if you aim too high, the ▶

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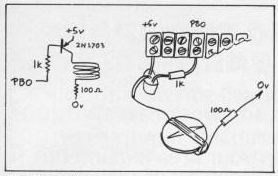
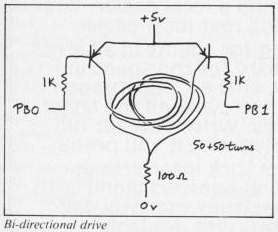


Transistor driver



Bi-directional drive

◀motor will not start. Try accelerating steadily by making the following changes:

```
5 V=2000
200 FOR I=1 TO V:NEXT
210 V=V-1
220 IF V<50 THEN V=50
230 RETURN
```

Now the delay will reduce progressively until the top speed is reached. Try various values in line 220. The speed will climb very slowly, rushing at the end. A steadier speed-up can be obtained with:

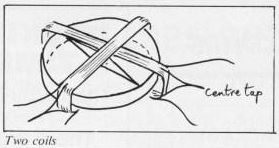
210 V = V*.995

You are now experimenting with techniques which you will need when you graduate to a genuine stepper motor. Of course the program is still grossly inelegant, and is not exactly versatile. Nevertheless the compass motor will already have taught you some of the pitfalls to look for:

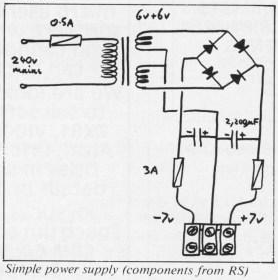
1. Without drive, the motor does not retain its position.
2. Settling to a new position takes the form of a poorly damped oscillation. At certain stepping speeds, there is a resonance so that the oscillations build up — the motor then stalls.
3. Movement at low speeds is "lumpy". This can be improved somewhat by doubling up on the applied steps, so that the sequence is N, NE, E, SE, S, SW, W, NW and back to N.
4. Sudden changes of speed will stall the motor.
5. There is no absolute position references — everything depends on the motor keeping in step.

Now let us try to introduce some style into the software, so that it will be of more general use. The codes which determine the coil polarities are best held in an array. I have a personal preference for putting all initialisation data at the end of the program, so that it does not obscure listings of the functional part. Thus the program will start with GOTO 10000, and all definitions will start at line 10000.

```
10000 DIM DR(7):FOR I=0 TO 7:REM DRIVE CODES
10010 READ J: DR(I)=255-J: NEXT I:HE=0
10020 DATA 1,5,4,6,2,10,8,9
10030 DD=56579:PD=56577:POKE DD,15:REM DDR, PORT
10040 GOTO 100 : REM HOUSEKEEPING DONE
```



Two coils



Simple power supply (components from RS)

If the number of steps to move is held in variable DI (distance), while the direction is held in RO (rotation) as a ±1, and if the current position is held in HEre, then an appropriate section of program to command the movement could be:

200 GOSUB 5000 : REM MOVE DISTANCE, ROTATION, SPEED

where the subroutine has been defined as:

```
5000  IF (DI<1) OR (SP<1) THEN RETURN
5010  FOR I=1 TO DI
5020  HE=HE + RO :REM ADD ROTATION TO HERE
5030  POKE PD,DR(HE AND 7) :REM OUTPUT CODE TO PORT
5040  FOR J=1 TO 1000 STEP SP:NEXT J
5050  NEXT I
5060  RETURN
```

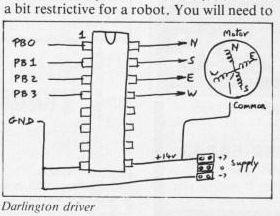
The variable delay of line 5040 might appear a clumsy way to set the speed, but it is effective unless the value of SPEED is excessive. A more elegant technique is that of the binary-rate-multiplier. This is useful for coordinating the movements of several steppers, but because of an uneven stepping rate the top speed is reduced.

To complete this program, you can add:

```
10 GOTO 10000
100 PRINT"DISTANCE, ROTATION DIRECTION, SPEED"
110 INPUT DI,RO,SP
200 GOSUB 5000
210 GOTO 100
```

and you have a demonstration program enabling you to command a move from the keyboard. You should then be able to write a more elaborate program which builds an array of programmed moves and then executes them.

A second stepper motor can be added, driven from bits PB4-PB7. This will enable you to make a plotter or a turtle, but will be a bit restrictive for a robot. You will need to use some clever addressing techniques if up to eight motors are to be commanded from a single user port.



Darlington driver

Before going into any more software detail, let us consider the electronic problems of interfacing one or more genuine stepper motors to the computer. The principles remain the same, but we must now be able to supply much greater currents. These are beyond the permitted drain which can be taken from the micro, and so a separate supply must be provided. You should be able to buy a 1 ampere supply, variable from 4 to 10 volts, for under £30.00. Even so, this is scarcely enough current — although an overload will merely "fold back" the output. The best answer may be to build the unstabilised supply shown in Figure 6 which will give around three amps output at +7v and −7v. Many stepper motors will require 12 volts or more to give of their best, and the power supply can be connected to give a single 14 volt supply — just by using the −7v terminal as the negative connection and ignoring the centre terminal.

A lazy but *risky* alternative is to take your life in your hands and use a motor-car battery charger. This will probably give you up to four amps, but will need a large external capacitor — 10,000 microfarads or so. It will also give poor regulation, and will put nothing better than a four-amp fuse between your circuitry's well-being or annihilation. Still, it's better than buying an endless supply of batteries, unless you can afford rechargeables.

The simple transistor will hardly have enough "beta" to drive a stepper motor from the earlier circuit. However, you can buy Darlington transistors with much higher gain. They are in fact a pair of transistors in cascade, but have the disadvantage of a higher "bottoming" voltage — they are less efficient in low voltage circuits. Nowadays it is much more economic to buy multi-function chips than to buy individual transistors, and the RS 307-109 chip contains seven Darlingtons, complete with input resistors and protection diodes, for well under £2.00. However, Murphy's Law gets you because to drive two stepper motors you need eight outputs, not seven.

Incinerated

Another complication is that these circuits are "sinks", not sources. The common point of the motor windings must therefore be connected to the positive supply, and the winding will be energised when the user port output bit is high, not low. The line of the computer program setting up the output patterns will have to be changed, to become:

10010 READ J:DRIVE(I) = J:NEXT I

Moreover the program will have to poke 56579 with 15 or 255 as early as possible, so that zeroes will be output and the motor not be incinerated under double its fair share of active currents.

With the change to the program described above, and with the circuit shown in Figure 7, you should be confident of your ability to drive stepping motors and should be ready to build a simple turtle.■

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ANSWER BACK

Old chestnuts roasted

WHERE'S THE expansion port on the Commodore 64?
UNLIKE the Vic 20, the Commodore 64 has 64K of RAM that cannot be increased. There is therefore no expansion port.
ARE THERE two different sorts of Commodore 64 on the market (there are two distinct colours and various nameplates)?
YES, THERE are two sorts of Commodore 64, NTSC and PAL. The NTSC is the American version and the PAL the English version. The PAL version is the only one available in this country.
WHERE DO you connect the printer when the disk drive is being used?
THE PRINTER is connected directly into the serial port in the back of the disk drive unit.
WHEN TYPING in a program, why is it not possible to get reverse characters (i.e. Print''(CNTRL/9)ABCDE'')?
THE LETTERS "ABCDE" will only appear in reverse when the program is run.
THE POKE location in the centre of the screen when addressed should show a white ball (see user guide), why doesn't it?
THE COLOUR memory needs to be POKEd with a colour different to that of the background colour before the ball becomes visible.
CAN YOU use a prerecorded software for the 8000 series on the Commodore 64?
YOU CAN, but only if the programs don't refer to the screen and there are no machine code routines.
CAN YOU run Vic 20 software on the Commodore 64?
VIC 20 software is not compatible with the Commodore 64. (In some circumstances if the program is in ordinary Basic and does not use POKE statements it will run.)
THE TANK v UFO program in the rear of the Vic 20 user manual has a line 135 with 89 characters, why?
THE MAXIMUM allowed on one line is 4 × 22 = 88 characters, therefore you must abbreviate this line. This is made possible by either omitting all spaces or by using the shortened forms of the Basic key words, eg P(shifted R) for the PRINT statement.

Looking for a good book

COULD YOU please tell me whether it is possible to obtain a book about high-resolution graphics on the unexpanded or expanded (16K) Vic 20.

Also could you tell me if there is a book about machine code available and, if so, from where.
A Grimshaw
Richmond upon Thames
AS YOU probably know there is a great range of books available covering most aspects of the Vic 20. Many of these, however, are barely worth looking at, especially most of the games books.

For a start on programming in high resolution graphics it is probably best to try and work your way through the Commodore Vic 20 *Programmers' Reference Manual.*

When it comes to machine code programming the best book is probably Dr Watson's *Beginning Assembly Language Programming on the Vic 20.*

Calling Micronet

I WOULD like to know when and if there will be a modem forthcoming to allow the Vic 20 to access the Micronet 800 service.

I understand the BBC and ZX Spectrum micros have had modems introduced, but have heard nothing about a Vic 20 modem. Is the Vic 20 screen display impossible to change to a Prestel compatible display? Will there only be a modem for the CBM64? Please help.
Andrew Lewis
Camarthen
Dyfed
AT THE moment there are only plans to introduce a CBM 64 version for Micronet 800. The feeling seems to be that the Vic 20 is not going to be around much longer, at least not long enough to make it worth investing in the design and manufacture of a modem connection.

Do not, however, be too disappointed. Although Micronet is an admirable idea, and has many applications for a business user, it does have many disadvantages for the home user.

It is relatively expensive to a) buy the modem b) become a subscriber to the service and c) pay all the phone bills which go with regular access to the information. There is not as yet a great deal of useful material on the service and it is frustratingly slow to download any software. We also feel that many home users are not happy having their telephones barred from ordinary calls while they are using the system.

It is probably better to resign yourself to having to wait until a faster cable networking system can be used. This is likely, however, to be several years away.

Much more on memory

I HAVE yet to discover the full advantages of the 16K Ram pack for the Vic 20.

Other than the knowledge that its introduction relocates the Basic, screen and colour, I have yet to find a successful routine/program to enable 3.5K programs to be run using the 16K addition.

This is particularly frustrating as I am not able to expand conventional programs above the memory available. I am new to home computers but "experts" have advised me that all the problems referred to can be overcome. Could you please advise me.
T Waldron
Quarry Bank
West Midlands
I AM sure you do not need us to tell you that the main advantage of the 16K memory expansion is that you can run far longer and, hopefully, better programs. You will not, for example, find many adventure programs which will fit inside 3.5K.

Programs written in Basic alone do not need to be adapted to run on the expanded system. Although the Basic program needs to be relocated the system will handle it automatically.

As you rightly imply, problems only arise when you have 3.5K programs which POKE to the screen or colour areas. To make these programs run try typing in the following POKEs before loading the program. I have not tried this routine, but it comes from a good source — an article by Mike Todd on page 30 of the Spring '83 Vicsoft catalogue.

```
POKE 641,0  <return>
POKE 642,18 <return>
POKE 643,0  <return>
POKE 644,96 <return>
POKE 648,16 <return>
SYS 64824   <return>
```

More than the Basics

I HOPE to buy a computer, probably a Commodore 64. One thing I would like to know is what is machine code?
Paul Freman
Pinner
Middx
MACHINE code is essentially just a long list of numbers which are converted into binary by the computer.

If you need help with a technical query or problem write to Answer Back, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD

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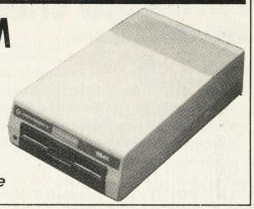


IT WAS a poor night at the Hell Nook Micro Club. Only Algernon, Bertie, Cyril, Drusilla and Ermintrude had turned up. They made the usual mess setting up their equipment.

The club room, Commodore Hall, was in fact, a dilapidated Sea-Scout hut, with trestle tables arranged down one wall, a row of sockets on the wall at the end and various chairs, boats, ropes and so on scattered all around.

The only really bright spots in the room were the row of plugs connecting the various micros to the power supply. Each was a different colour, matching the colour of the lead running to each micro. Five different screens were each glowing with the graphics of their respective owners' favourite game (all different of course). Except, that is, the 20 inch colour TV, which seemed to have become detached, as did the joystick in the debris on the floor.

When the five connected their systems up, each machine was complete, each with its single peripheral (the joystick and a light pen, a voice box, some disk drives, and a printer). Can you find where the disconnected kit belongs?

Here's some information that may help: The red lead runs to the Pet, the green plug powers the light-pen, Frogger is running on the machine connected to the yellow cable and the Spectrum is on the table next to the micro on the blue lead.

There's a 26 inch screen connected to the Vic 20, King Kong is the game running next to the tiny flat-screen receiver and Froger next to the monochrome 14 inch television.

The cassette drive is connected to the Commodore 64, and the voice box is on the middle machine.

The invaders game is not showing up too well on the monitor, but the Hobbit, which is running on the Oric, looks clear enough. The adventure game is huge, though, and needs disk drives all the time.

The left most machine is the Spectrum and the micro powered by the green plug sits to the right of that on the white one.

All the machines, peripherals, leads, plugs and TVs are in the same order. They might be in a mess, but not that much of a mess.

As a tie-breaker, complete the following sentence in less than 15 words: I want to add Commodore disk drives to my system because . . .

Send your answers to Competition Corner, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD — to arrive no later than the last working day in the month on the cover of this issue. The name of the winner, and the solution to the puzzle, will be published in the issue after next. Entries will not be acknowledged and we cannot enter into correspondence on the result

MARKET VIEW

Shake, rattle, and roll . . .

WHATEVER happened to the money-spinning computer industry that was never going to look back? In recent weeks, the industry's relationship with investors has come under increasing strain, but Commodore thinks it can stay ahead.

On the home computer front, Iotech is no more, while Newbrain maker Grundy Business Systems, burdened by debts of nearly £3 million, searches for a saviour. The news at the heavyweight end of the market is no better. Atari, Texas Instruments, Mattel, Victor Technology and Fortune Systems have all turned in massive losses this year.

In the UK, ACT introduced the Apricot at the PCW show to a fanfare of favourable reviews and advance orders: ACT shares promptly fell 30p in two days.

Acorn barely attracted enough support to float 10% of the company's shares on the Stock Exchange's Unlisted Securities Market at the minimum asking price. One stockbroker analyst could even say of this company which has a seemingly impeccable pedigree: "Fundamentally, Acorn are a disaster. There's a very real chance they will be bust in two years."

What lessons can be learnt from this shake-out in the industry? First, after a spell when small seemed beautiful — Acorn sales last year were £42 million against 1979's £31,000 — it looks at the moment as if big is better. Mighty IBM, after losing market share to rivals, is slaying mainframe competitors like Honeywell and Amdahl, carrying all before it with the cheaper PC and sending tremors through Apple's share price just with the threat of the Peanut.

If size is to be a guarantee of survival — although remember that Atari and Mattel turned huge profits into losses of hundreds of millions of dollars — then Commodore looks set to stay the course. Commodore itself believes: "Eventually the number of computer producers will be reduced to a handful of companies" — and backs its survival with assets of £330 million devoted to computer interests.

Confidence and assets like that enable Commodore to press ahead with plans to raise production at its Corby plant to three million units a year.

The second moral from these troubled times is that grabbing a bigger slice of the market means accepting ever shrinking profit margins and/or pruning costs ruthlessly. Many companies over-produced and couldn't cut prices to keep up with newer, more cheaply produced rivals — they ended up with piles of stock back at their warehouses, spelling hefty losses or bankruptcy.

Here again, Commodore looks well placed. In spite of the current difficulties facing the small computer market, it seems clear that consumer demand is still rising. Steve Greenberg, New York marketing consultant to Commodore, reckons that two million home computers were sold in 1982. The 1983 figure will be nearer five million and Commodore expects to take 40%. Greenberg puts the world market at 50 million units by 1987.

Commodore chairman Jack Tramiel hopes to keep Commodore in front by following two principles: "We believe in high volume products and we pass our cost savings on — the sooner the better." That philosophy has made deep inroads into Commodore prices at all levels of the computer market. At the lower end, the Vic 20 now costs £140 against last year's £194 while the price of the Commodore 64 has dropped from £300 to £229.

Dealers big and small — operating on 30% average discounts — are willing to sell the 64 below £200 and US buyers pay a mere £133. In theory, more is still to come.

But cutting margins to bare minimums may spell trouble for the firmly established Commodore — even Tramiel must accept that in an industry where companies are cutting their own as much as each other's throats, there are no winners.

Christmas in the UK will be crucial — Commodore hopes to sell 400,000 computers by Christmas backed by a hefty £10 million advertising budget. If rivals follow suit, it looks like being a happy Christmas for consumers, but how many computer firms will enjoy a prosperous New Year?

The Lightening Oric Assembler. £9.90*

There are other assembler/editors available for the ORIC but none combine the same features and ease of use that we have obtained with this comprehensive utility program for the ORIC 48K. The manual which accompanies the assembler gives a brief insight into machine code and the use of assemblers to enable anyone to write in assembly language after just a little study. Full specifications of the assembler cannot be fitted into the small space available here and so they may be obtained from your local dealer or direct from Mr. Micro.

*Includes comprehensive instructions booklet.

Crazy Golf £6.90

48K Spectrum

Crazy golf is a new program for the 48K Spectrum you are required to clear the course avoiding and circumventing the many strange obstacles finally putting your ball in the hole. The par for each hole is displayed and a novel direction indicator combined with a force indicator enable you to send the golf ball in the direction you feel is the best one to clear the course. Crazy golf really is crazy but most of all it is fun and will be found to be very enjoyable by all members of the family.

For use with Joystick and keyboard.

Bengo £6.90

Vic 20

An exciting program for the unexpanded Vic 20, which combines fast moving strategy and reflex skills. You must control Bengo the super Eskimo against the dreadful snow Yeti – Half blind and half witted the Yeti can smell a good Eskimo lunch – the only protection Bengo has is to hurl huge blocks of ice across the frozen waste at the Yeti.

– Don't get distracted – or you'll be personally responsible for the demise of an Eskimo!

For use with Joystick.

Dracula £6.90

48K ORIC

A superb adventure for the 48K ORIC. This adventure is written in the good old style! No silly graphics, no gratuitous drawings, no distractions from pure mental images of horrendous realism. This evocative text adventure of the old genre will have Oric owners shivering with anticipation and perhaps fear.

Dare you load DRACULA into your ORIC 48 ?!!

By keyboard.

No shocks– Plenty of surprises!

Mr. Micro means programs you can trust. Programs that are as exciting when you load them as they look at your dealer. Programs that come proven and refined. Programs that bring you the breathtaking excitement of arcade games with the special extra dimension of real mental challenges – all at the right price. Plus accessories and utilities which extend the value of your computer. Ask for Mr. Micro by name at your local dealer. Or order your games direct, post-free, from: Mr. Micro Ltd. 69 Partington Lane, Swinton, Manchester M27 3AL. Cheques should be payable to Mr. Micro Limited. Ring our 24 hour hot-line for payment by Access or Visa on: 061-728 2282.

MR. MICRO

Amigo £6.90

Vic 20 8K or 16K expansion.

Hey Amigo you gotta run fast ah. The banditos they are a chasing you and they will a geta you ifa you do nota escapa OK. You musta runa founda the blocka, when you run round de corners ofa de city the banditos they are frightened to go there and you score de points. Pity you have nota gota gun but a joystick can be fun.

For use with Joystick.

Digger £6.90

Vic 20 8K or 16K expansion

Your remote viewer shows the path of the professors devilish digging apparatus. Using your computer linked remote control you must guide the digger beneath the earth to collect the rare micronite gems. Unfortunately the micronite is protected by the micronits who will plague your machine in order to attempt to stop its progress. You may be able to kill the micronits by skilfully manoeuvering your digger beneath a subterranean stalactite which will then fall killing any micronit in its path. This is a novel implementation of a popular arcade game. For use with Joystick.

Humphrey £6.90

Vic 20 BBC Model B

This new game for the BBC Model B or for the VIC 20 (8K or 16K expansion) and also for C.B.M. 64 involves some tricky decision taking.

Object of game is to make Humphrey land on all the cubes thus changing their colour. Unfortunately Humphrey is being chased by a bouncing ATOMIC BOMB! You will soon learn that this deceptively simple game has tremendous addictive properties and quite a high degree of tactical skill.

For use with keyboard or Joystick.

Mysterious Island £9.90

Vic 20 16K

Escape from prison in a hot air balloon – try to land it on Mysterious Island, then the fun really begins. ● Booby Trapped Fields ● Killer Bees ● Hostile Natives ● Hidden Clues ● Force Fields ● Capture the Nautilus ● Full Graphic Display ● Several Games lead to Exciting Climax ● Separate Practice Program ● Includes Blank Data Tape to store the game to play later.

All successful adventures can claim a unique personalised award by sending Mr. Micro their final position at the end of the game – By Joystick or keyboard.

RAMDAM £13.90

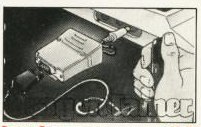
Vic 20

This accessory enables programs which would normally only work with 5K expansion to work with 8K or 16K expansion. RAMDAM saves having to buy a 3K pack if you already own an 8K or 16K. With RAMDAM and a Commodore 16K expansion all known tape games will run on your Vic 20. ● Includes Memory Test Program ● Free 6.5K game – MICROVADERS for use with Joysticks.

Punchy £6.90

Spectrum 48K

Punch has taken Judy for his evil purposes and locked her away. Judy has called upon the forces of goodness to escape, so with the help of our hero Bobby the policeman and you the purchaser of this fine program you must guide brave Bobby across the stage to rescue poor Judy. Leap the gaps. Jump over the dogs. Leap the alligator pit. Dodge the tomatoes. Rock the crib. Collect the sausages and finally rescue Judy. By Kempstone joystick or keyboard.



Dragon Tamer £9.90

Dragon 32

Allows Atari type and other digital joysticks to be used with the Dragon – giving better response and more control. For the first time your Dragon will be able to reflect your true skills. ● Achieve higher games scores ● Less Frustration.

Plus To ensure maximum value, Dragon Tamer includes two original games for use with digital Joysticks.

Goldrush £6.90

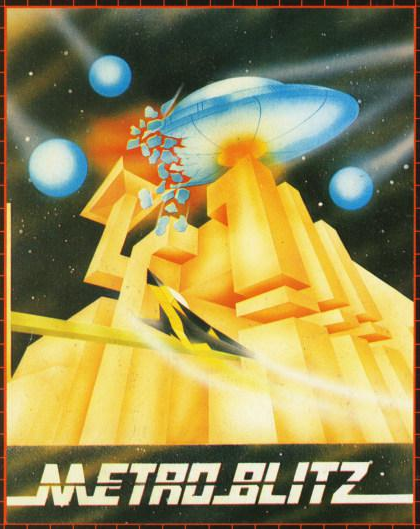
Vic 20 3·5k

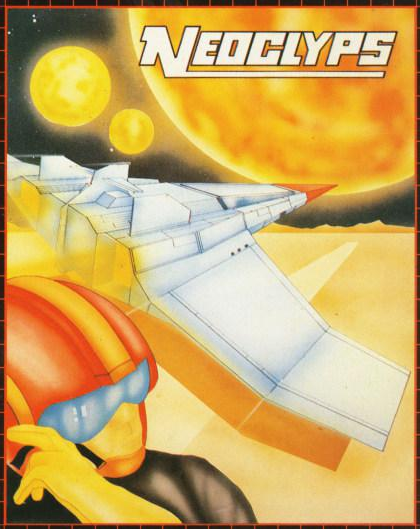
This graphic adventure program was the first in the world to offer real gold for the successful adventurer. An idea which has been much copied but never equalled. ● Fun ● Educational ● Challenging ● Clues ● Puzzles ● Searches ● Fast Reaction Game. For use with keyboard.

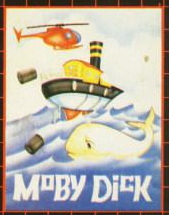
AVAILABLE AT Boots NOW

P.S.S. INTRODUCE THE FIRST OF MANY FOR THE COMMODORE 64

To launch our new range of Software we have selected the finest arcade action and adventure from the U.S.A. Canada and the U.K.







EASY TUTOR

For the computer programming novice, a ten-lesson tutorial in the basic language, comprehensive coverage from data statements, to loops and subroutines, to arrays and matrices. Program examples with line by line explanations, multiple choice questions, "Homework" assignments.

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COSMIC SPLIT

You are caught in a vicious jungle of giant insects. Centipedes are attacking you from all sides. Killer fleas are dropping from the sky, and to top things off there's a venemous spider lurking in the background.

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METROBLITZ

The object of this game is to defend your city against an onslaught of suicidal aliens. Six different types of aliens bombard the player's city without mercy, having no respect for their own lives.

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You are the GOOD GUY, Freedom Fighter and renowned star pilot. The BAD GUYS, an alien race from distant solar system have invaded NEOCLYPS, one of your colonial planets. Being the good guy that you are, you set off to liberate the Common Folk of Neoclyps from the oppression of the Bad Guys. The Bad Guys have populated Neoclyps with several radar towers which reveal your position to them.

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KYSTALS OF ZONG

Your object is to overcome various obstacles and overpower creatures intent on stopping you as you progress on your quest for the Krystals of Zong. Quick reactions will be necessary if you are to succeed clues will guide you.

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The object of this game is to blow up submarines, destroy the helicopter and catch the falling pilot, but do not kill the whale.

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